All tutorial files can also be downloaded from: **www.3dartistonline.com/files**

www.3DArtistonline.com

3DArtist™

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Practical inspiration for the 3D community

NEILL BLOMKAMP EXCLUSIVE

PROFESSIONAL VFX SECRETS

Elysium's director on today's state-of-the-art movie visuals

CHARACTER DESIGN MASTERED

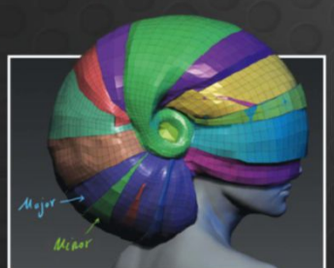
From concept to render – conquer the pipeline

GAME OF THRONES

How Pixomondo designed the hit series' ferocious dragons

VIDEOGAME ENVIRONMENTS

Build interactive spaces using our top professional tips



Render realistic hair

Create flowing locks using this simple step-by-step workflow

38 PAGES OF IN-DEPTH TUITION

From hair and fur to soft body dynamics

BUNKSPEED 2014

Just how powerful is the latest release? Find out inside

DigitalEdition GreatDigitalMags.com ISSUE 059

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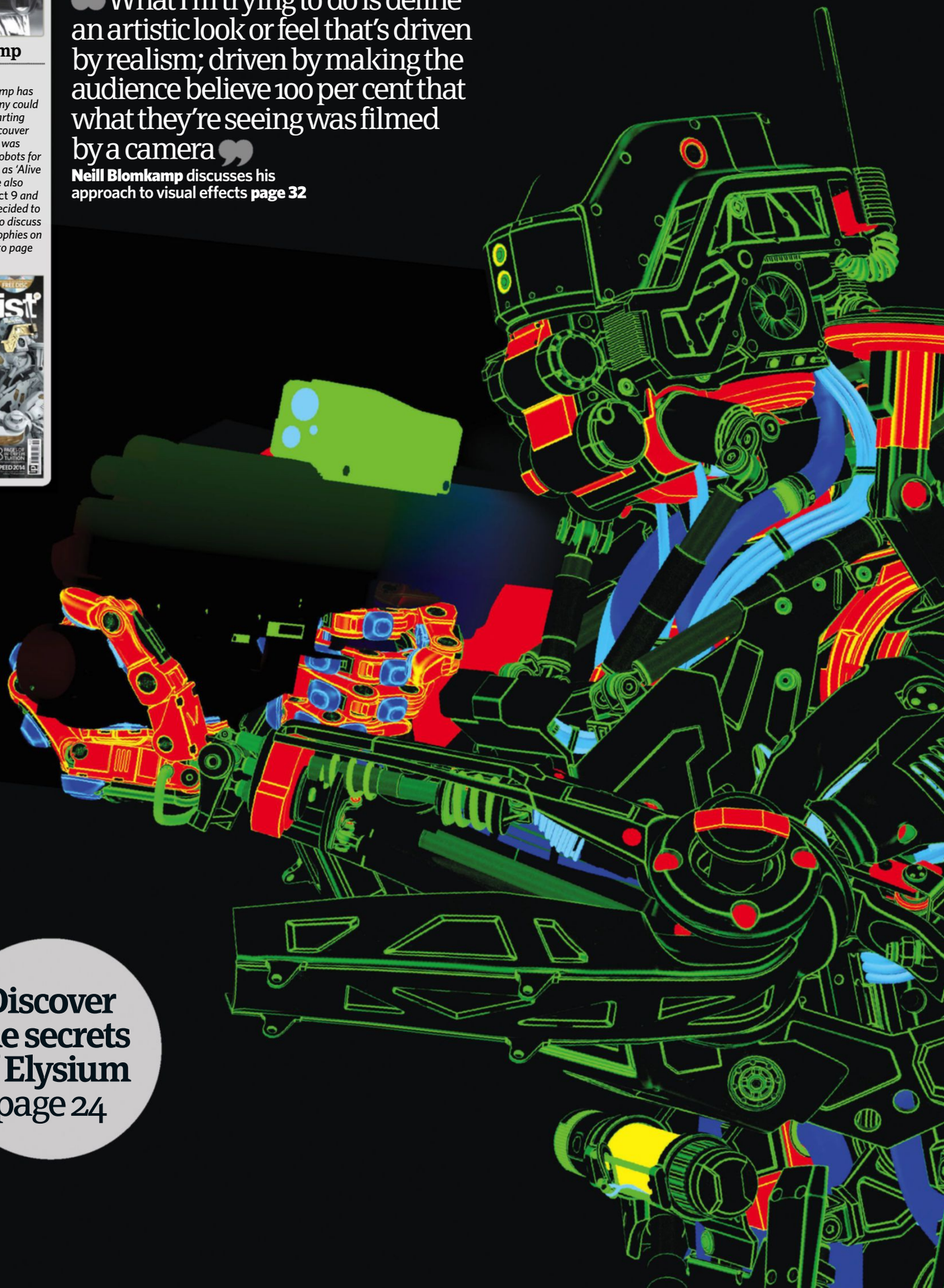
Neill Blomkamp

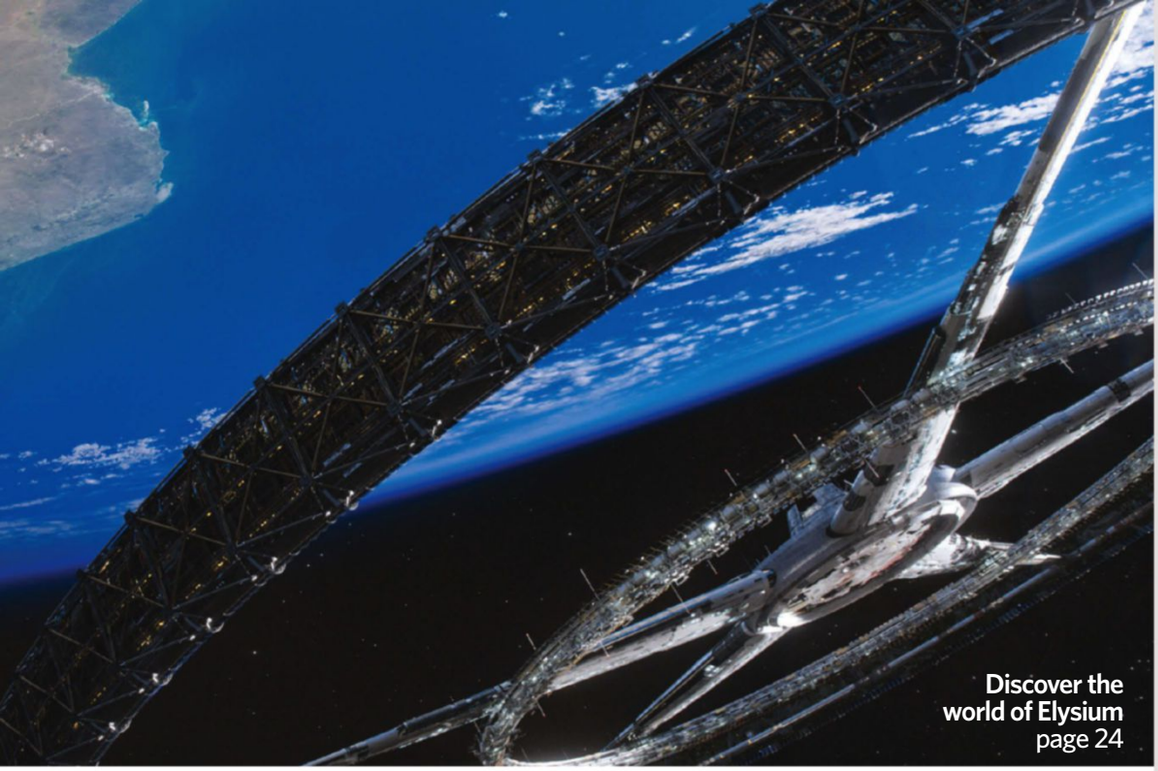
At the young age of 33, filmmaker Neill Blomkamp has achieved more than many could hope to in a lifetime. Starting out as a student at Vancouver Film School, Blomkamp was soon creating dancing robots for Citroën and shorts such as 'Alive in Joburg'. Of course, he also went on to direct District 9 *and* Elysium. *As such, we decided to meet with the director to discuss his thoughts and philosophies on the world of VFX. Turn to page 32 to learn more.*

> "What I'm trying to do is define an artistic look or feel that's driven by realism; driven by making the audience believe 100 per cent that what they're seeing was filmed by a camera"

Neill Blomkamp discusses his approach to visual effects **page 32**



Discover the secrets of Elysium page 24



Discover the world of Elysium page 24

Welcome

to the magazine and 116 pages of amazing 3D

Hello and welcome to 3D Artist magazine! Given that *District 9* is one of our favourite films, it's natural that we were very excited about *Elysium*. As such, we caught up with the Image Engine team to discuss the making of the film and chatted with director Neill Blomkamp about his own history in CG. We've also got some great tutorial content this month and a disc that's bursting with accompanying video tuition. So, insert the disc, turn the page and let's get going!

Chris Deputy Editor

Every issue you can count on...

1. **Exclusively commissioned art**
2. Behind-the-scenes guides to images and fantastic artwork
3. **A CD packed full of creative goodness**
4. Interviews with inspirational artists
5. **Tips for studying 3D or getting work in the industry**
6. The chance to see your art in the mag!

This issue's team of expert artists...

Benjamin Erdt

Guerrilla Games character artist Benjamin talks us through the creation of his space beast, *Lukruk*

Joe Nazzaro

Joe goes behind the scenes of Elysium, discovering how VFX studio Image Engine worked its magic

Stefano Tsai

The Creative Assembly's senior artist reveals his approach to concepting game environments

Yasin Hasanian

The extremely talented Yasin walks us through his step-by-step guide for rendering photorealistic hair

Gustav Melich

This issue Gustav decided to channel his youthful passion for Rubik's Cubes into a Houdini tutorial

Jahirul Amin

Jahirul continues his environment series in Maya and also takes a look at new release RaySupreme v1.1

Alan Marques

Want to use iClone4 on the cover disc for pre-vis work? VFX supervisor Alan Marques shows how

Tim Clapham

CINEMA 4D expert Tim takes us through his soft-body dynamics workflow. For more see **www.helloluxx.com**

Filippo Veniero

Our Blender expert Filippo casts his eye over hair and fur using the ever-improving Cycles renderer

Dave Scotland

If you've got a question about NUKE, Dave's got the answer. Turn to page 92 for his point cloud tutorial

James Morris

It's the clash of the titans, as James pits AMD against NVIDIA to see who has the best graphics card tech

Poz Watson

This issue we asked Poz to discover just what it is that makes Vancouver Film School so very special

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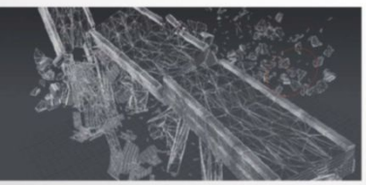
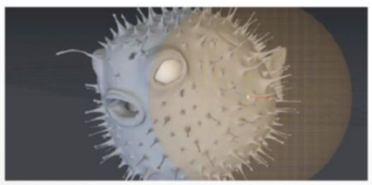

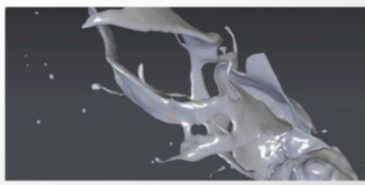

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Create Maya creatures

"In this tutorial you will get an insider's view of this creation, from concept to rendering"

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Render photorealistic hair

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Build videogame environments

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Hair and fur in Blender

> The design challenge was enormous. We were building a self-contained world that was two kilometres across and 125 kilometres around

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Seven pages of great artwork from the 3D community

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"You can really tell this image was inspired by photography. The composition and hyper-real aesthetics make us feel as though we are very much intruding on this small frog's life"

Larissa Staff Writer

"Inspired by macro photography, I wanted to create a scene where a frog is the star. I really enjoyed re-creating the oily skin of the frog"

Jeremy Celeste, *Look At Me*, 2013

Artist info

Jeremy Celeste

Jeremy Celeste is a French 3D artist working as a generalist/lighting TD at In Efecto

Personal portfolio site www.jeremyceleste.com

Country France

Software used Maya, NUKE, mental ray

Work in progress...

> *Favelização* was inspired by the incredible labyrinthine imagery of Jonathan Gales' 'Megalomania'. I based this image on his artwork of unfinished, incomplete or broken architecture to illustrate my visions of slum-settlement construction in Rio de Janeiro
>
> **Ross Damien Jordan,** *Favelização,* 2013

Ross Damien Jordan

Ross is an architecture student who combines CG art and architectural theory

Personal portfolio site www.behance.net/rossdamienjordan

Country UK

Software used 3ds Max, Mudbox, V-Ray, Photoshop

Work in progress...

> This is intriguing work, combining futurism with the compact, ramshackle layout of South American favelas. It's arch-vis seen through the lens of dystopian sci-fi
>
> **Chris** Deputy Editor

> This image was created as part of Kris Costa's workshop. I had this mushroom guy idea stuck in my head for quite some time, so this was the perfect opportunity for me to finally get it out there. I never thought I would take it as far as to make a complete image out of it
>
> **Aleksandr Kirilenko,** *Fred the Mushroom*, 2013

> I'm not sure whether to be impressed by the huge talent clearly evident in this character model, or just repulsed by his grimy funghi features!
>
> **Chris** Deputy Editor

Artist info

Aleksandr Kirilenko

Born and raised in Estonia, Aleks is passionate about digital sculpting and CG characters

Personal portfolio site www.mrbananas.carbonmade.com

Country Estonia

Software used ZBrush, 3ds Max, MARI, KeyShot

Work in progress...

"The composition, textures and colours all seem to open up a window into another world and point of view. The performer's expression really captures the imagination"
Larissa Staff Writer

Artist info

Wei Long Zhong
Born in 1987, Wei Long first began studying CG in 2010 after having loved film since youth

Personal portfolio site
www.zwl19870511.cghub.com

Country China

Software used 3ds Max, ZBrush, Mudbox, Photoshop, mental ray

Work in progress...

"This image shows a normal performing artist of a Beijing opera painting his face backstage before his performance. The last step is tracing over the golden eyes. I made the basic model in 3ds Max and used ZBrush to make all of the details, Photoshop for textures, and mental ray for rendering"
Wei Long Zhong, *Da Nao Tian Gong*, 2013

Marcus Büttner for Edelkollektiv

Marcus specialises in 3D visualisation and works for Creative-Network Edelkollektiv

Personal portfolio site
www.marcus-buettner.com
www.edelkollektiv.com

Country Germany

Software used 3ds Max, V-Ray

Work in progress...

"Last year I saw the latest Ikea catalogue and I really loved one of the photographs inside. There's nothing fancy about the modelling or the textures. I spent most of the time on the lighting, which was a combination of HDRI and area lights. The carpet was done with the 3ds Max Hair and Fur modifier"

Marcus Büttner, *Ikea-Inspired*, 2012

"Marcus always manages to capture a very inviting, light, modern atmosphere with his indoor 3D visualisations. This comfortable-looking armchair seems like the perfect place to read **3D Artist**!"

Larissa Staff Writer

"I made *Pinup Girl* for a pinup-themed modelling challenge at CGHub. Gil Elvgren, rockabilly and the 60s were my biggest sources of inspiration. It ended up placing first. I used LightWave 3D to create the base meshes, ZBrush for all the sculpting, Marvelous Designer for creating all the clothing and V-Ray for the final render"

Anders Ehrenborg, *Pinup Girl*, 2013

Artist info

Anders Ehrenborg

Anders co-founded Paris-based Digital Banana Studio in 2005 and works as a 3D lead

Personal portfolio site www.andersehrenborg.com

Country New Zealand

Software used 3ds Max, V-Ray, LightWave, ZBrush, Marvelous Designer 2

Work in progress...

"I love how this sculpt combines vintage aesthetics with modern character design. Simple details, like the fact that the phone plug isn't connected, emphasise the playful pinup theme"

Larissa Staff Writer

Blackmagicdesign

* Lens and rail kit not included

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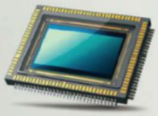

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"de Chirico was the last piece of the puzzle, when Topor's style didn't work in 3D, the surrealist-metaphysical Italian painter was perfect," explains director Marcin Wasilewski

Project title 'Lost Senses'

Description 'Lost Senses' is a short story about an encounter in an abstract world, stylised like the paintings of Giorgio de Chirico. A man is going to meet a woman in a flying city. Will the lovers meet each other? The man moves like a Parkour practitioner, climbing up on the buildings. However, one unguarded moment is enough to make him lose his senses and possibly his chance at love

Country Poland

Production Company Grupa Smacznego / The film was co-financed by the Polish Film Institute www.pisf.pl/en

Software used Blender, After Effects, Premiere, Photoshop

Website www.g-s.pl/en

Finding Blender's fine-art potential

How a small studio made its 3D software debut in Blender to create an award-winning abstract animation

It's hard to believe that 'Lost Senses' was Polish boutique studio Grupa Smacznego's very first 3D animation. The short won the SIGGRAPH Computer Animation Festival Jury award earlier this year and has since been showcased at festivals worldwide to widespread acclaim. Even more incredible is the fact that it was produced almost entirely using the open-source 3D software, Blender.

Aesthetically inspired by the metaphysical paintings of Italian artist Giorgio de Chirico, 'Lost Senses' presented the ideal opportunity for the studio to experiment away from its normal 2D workflow. "I knew this film was going to be about the modern world, where we are constantly attacked by pieces of information that make us distracted, causing us to lose focus on the important things," explains director Marcin Wasilewski. "We wanted our film to look like an oil painting, as well as to create the effect of the animation being on a canvas along with the feel of a space with distinct perspective."

To give imagery in the film this particular style and depth, the studio used camera projection techniques within Blender to transmit 2D background images onto 3D geometry. This resulted in an effect that's very similar to 3D mapping. "de Chirico paintings have an unreal, impossible perspective, like a hybrid of axonometric projection and linear perspective," says Wasilewski, telling us that this, as well as re-creating the animation's abstract objects, required a lot of work during the modelling process.

You can watch the Lost Senses trailer at www.lostsenses.com/o-filmie

These objects consisted of several bizarre geometric shapes that needed to have special camera settings in order to look the part.

The team also applied Blender's non-photorealistic rendering and used compositing to create the final look of each shot with simple render passes, as well as by keying all the animation in 'Lost Senses' by hand. "Some of de Chirico's paintings were like ready-to-use backgrounds for our film. It was in these paintings that I first found the idea for a motif featuring a failed rendezvous, but there was a secret in it. We couldn't resist," Wasilewski says.

> "The 3D software we chose was Blender. It was an all-in-one 3D software that assisted us on almost every stage of production"
> **Marcin Wasilewski** director

Searching for style

Director of 'Lost Senses', Marcin Wasilewski, reveals the path to re-creating de Chirico's style

"At first, searching for a style wasn't easy," says Wasilewski. "The first inspiration for the short came to me when I was reading *Roland Topor or Strangled Laughter*, the biography of an artist by Frantz Vaillant. However, after some initial tests it was obvious for me that Topor's style wouldn't work in 3D animation. As such we started researching among other surrealists: Rene Magritte, Dali and finally de Chirico. I knew immediately that his style was going to be the right direction."

Pioneering the future of 3D projection

How MPC developed a new approach to 3D animation, creating special effects without the use of VFX

Bernat Amengual, lead animator www.moving-picture.com

In Travis's new music video for the single 'Moving', the band was inspired by a short film from directors Wriggles & Robins that featured projected animation. Enter MPC, who helped recreate a similar effect for the Moving video using 3D animation projected onto the band members' breath. Bernat Amengual, lead animator for the project, tells us more.

What types of software were used to create the project and how long did it take to produce?

The beauty of the spot is that it looks like it has been created with VFX, but in actual fact it was all captured in-camera. We primarily used CINEMA 4D for the 3D camera movements, with additional 3D components and the animations composited in After Effects. Maya was also used to create the animations of the man seen in the film.

We took some of the animal structures from MPC's creature library and then altered the geometry so it was pared back and less detailed, which was perfect for the film. We created the animations in Cycles and then looped them. It took around five weeks to develop the animations and get them to a stage where everyone was happy.

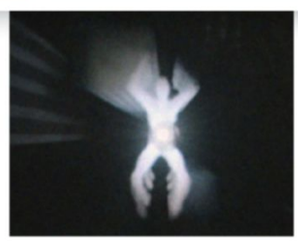
Were there any challenges MPC faced when creating an animation with no VFX involved?

This was definitely something different for us and we jumped at the chance to be part of it. As the directors were testing the projections in a cold lock-up in east London, it was hard for us to tell what they would look like while working on them in the studio, but we got there in the end and we are all so happy with the finished project.

"This project focused so much on the movements and getting the interactions right. We had to experiment with camera angles and there was a lot of going back and forth," explains Amengual

> "The beauty of the spot is that it looks like it's created with VFX, but in actual fact it was all captured in-camera"
>
> **Bernat Amengual lead animator**

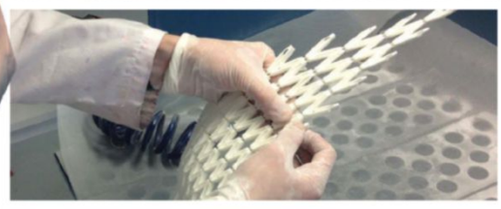
The end result of the projection is a ghostly, beautiful feel



Do you believe the work on this video has paved the way for similar and even more ambitious projects?

I think it probably has opened some doors. Everyone wants to pioneer a new, innovative way of telling a story and this is a really beautiful technique. Maybe the next step is to develop this in other directions – something more complicated...

The studio modelled and designed the 3D dress in Maya, working out how to map the chainmail-like design of the dress across the curvature of the body



The future of 3D-printed fashion

"I think there's a huge future for 3D printing in fashion," says Bitonti, though he tells us there is still a lot to be done before 3D-printed clothing is practical enough to be worn on a regular basis. "The studio is currently working on another 3D-printed dress and jewellery line, as well as writing input to customise what the printers can do."

"The dress we did for Dita was great because it weighed only about 11 pounds. It was actually a practical garment, though a little bit bulky maybe," says Bitonti

Dita Von Teese's 3D-printed gown

Francis Bitonti describes the story behind his design studio's work on the star's fully articulated nylon creation

"Michael was doing something else at the time, some kind of custom leather jackets or something. He didn't really want to do that, he wanted to do something new," begins Francis Bitonti, CEO of the design studio responsible for re-creating designer Michael Schmidt's original sketch for Dita Von Teese's gown in Maya. "He met with the ShapeWays team, who showed him what they do. That became the idea of the 3D-printed dress." The gown was produced using laser-synthering methods and was printed in different parts before being finalised and assembled by hand, which included dyeing the nylon black and attaching 12,000 crystals. "We also had a custom script that we used to control the thickness of each curve, making sure it didn't stretch too much and get too thin," explains Bitonti. "The amazing thing is you can build anything you can draw. If you can model it, you can make it..."

"The worst thing that I can do is goof around if I have no work. That's a recipe for letting your art skills get rusty and lets you drop, unnoticed, out of the public eye," says Williams

Giving 3D art a narrative

Mary Williams discusses how she uses story within 3D art to create more compelling results

Mary Williams, digital artist www.worldhavens.com

Mary Williams recently hosted a seminar during the first live online Poser conference, detailing the ways 3D artists can include storytelling within their work. "One of the biggest reasons storytelling is so important is that it gives you a way to connect with your audience and a way to make your artwork more memorable," she says.

"Every single person out there remembers things in different ways," continues Williams. "If you take a dozen people and place the same picture in front of them, let them look at it for a minute and then take it away, one person would remember a bird, another the colours in the image and another would remember the expression on a person's face. All of those extra details that help to tell the story hit those high points of memory, so that more people see, understand and take something away from your work."

> "It all starts with an idea! The complex ones I'll stop and sketch out, but mainly I'll build the structure for any 3D image in my mind"
>
> **Mary Williams** digital artist

Portfolio highlights

- The only Photoshop competition I entered (Immerse Yourself in Photoshop 3D) was when they were first coming out with 3D support and looking for ways to tell people about it. I won first-place in that contest with *Bringing the Dreams of Artists to Life* (2010).
- In the autumn and winter of 2012, I worked with the administrators of Runtime DNA to build the apocalypse- and silent night-themed images for their two largest sales and events of the year: the annual and winter sale/events. In fact, we generated a huge number of images, three of which later appeared on the DVD of *ImagineFX*, issue 95 (2012).
- In March, the first live online Poser conference was held. I wrote, rendered and developed my own seminar, describing all the ways and whys of including storytelling in your 3D artwork (2013).

"The genre that truly calls to me the most is steampunk, which asks: 'what would the world be like if the future had happened sooner?'" says Williams

"I used physically based simulations – such as rigid body, soft body, fluid and so on – then used RealFlow to create the liquid forms," explains Kobari

"One of the great benefits of using CG is that it makes it possible to express any kind of visual world. I can create everything just from my imagination," says Kobari

Surreal and sublime

Triple Additional's Yasuhiro Kobari talks about the inspiration behind the Tokyo-based visual art studio's music video for Megrim

Yasuhiro Kobari, visual artist www.3additional.com

"Our client, Megrim, showed me his concept of a video that leaves the audience feeling like spectating the world as a god," explains director of 'Unending Chain', Yasuhiro Kobari. The surrealist music video, which the studio created for Megrim, was inspired by the Buddhist thought that all things in the world are interconnected. The video was created using 3ds Max, RealFlow, After Effects, Adobe Premier and Photoshop. It aims to be a piece of art that illustrates the beauty of the unending chain of all life. "Everything is connected, everything changes, nothing lasts and every living thing exists upon the deaths of other lives." Kobari concludes.

Company Triple Additional co. Ltd

Contributors
Producer/Director Kentaru Takaku
Visual Artist Yasuhiro Kobari
Visual Director Takeshi Naito

Software used 3ds Max, RealFlow, After Effects, Adobe Premier, Photoshop

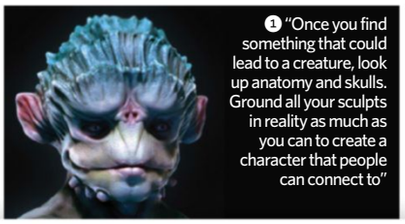
Website www.3additional.com

Gripping creature portraits

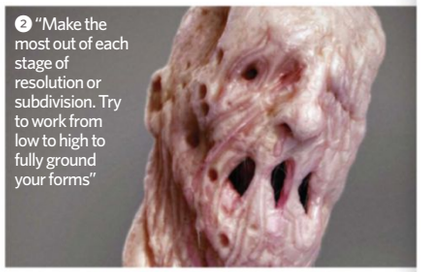
Freelance artist Thomas Lishman talks us through his portfolio of fantasy creature portraits that are grounded in realism

Thomas Lishman, freelance digital artist www.tlishman.co.uk

Thomas Lishman's striking portraits are heavily inspired by pop culture and sci-fi, each piece taking from just thirty minutes to four hours to create. The majority of his artwork consists of speed sculpts created in ZBrush and composited together in Photoshop. This pipeline enables Lishman to begin sculpting quickly and experiment with the shapes created before he starts searching for the references that enable him to base his final creature work on reality. Lishman prefers the Clay Buildup and Move brushes, which he utilises to create most of the sculpt. Below he discusses some of the techniques used to create his impressive portfolio.



1 "Once you find something that could lead to a creature, look up anatomy and skulls. Ground all your sculpts in reality as much as you can to create a character that people can connect to"

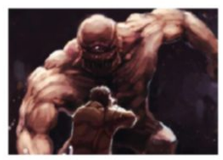


2 "Make the most out of each stage of resolution or subdivision. Try to work from low to high to fully ground your forms"

3 "Don't be afraid to start sculpting without any solid ideas. Push and sculpt the clay and find shapes in it as you would a squiggle on a page"

BFX tickets on sale

The very first BFX Festival will take place in Bournemouth from 25 to 29 September



The BFX Festival will include a speaker series from the world's leading VFX studios such as ILM, DreamWorks, Double Negative, Cinesite, Rhythm and Hues, MPC and Framestore.

The event will also feature specialist workshops by professional artists such as Scott Eaton and Adam Redford. Attendees can also visit a careers hub, a free concept art display, a variety of movie screenings and tech demos from software companies such as Autodesk, Next Limit and Adobe – and that's just scratching the surface.

Tickets for the festival start at £12.50, or £10 for students, so to book now visit www.bfxfestival.com.

A

B

Images of the month

These are the illustrations that have been awarded 'Image of the week' on 3DArtistOnline.com in the last month

Share your art
Register with us today at
3DArtist online .com
www.3dartistonline.com
to view the art and chat to the artists

A Mine Salvation – Back Home
» **Mohammad Hossein Attaran**
3DA username mhattaran
Mohammad says: "This image is part of series of artworks called 'Mine Salvation' that I completed for Bio Machines, a challenge judged by Scott Robertson. Fortunately I was among the winners. I'm now working on a short animated version with the help of friends."
We say: *Big hulking mechs just never get boring, do they? The depth of field gives a real sense of scale, but you can still appreciate the detailed modelling on show here. We can't wait to see it animated!*

B IFA
» **Marcel Haladej**
3DA username Vsha
Marcel says: "I wanted to create an atmosphere shortly after sunrise with a little background story, where old houses have to make way for the new constructions. This is the story of my hometown. This was created with 3ds Max, V-Ray and Photoshop."
We say: *It always inspires us when something as everyday as a construction site can be transformed into something altogether more touching and poignant by the hands of a 3D artist. Great work, Marcel.*

C Black & White Guitar
» **Jesse Gutierrez**
3DA username Jesse
Jesse says: "This image was made for my portfolio as a personal project. I created it during a night of music and 3D design."
We say: *This is obviously a passion project from a musically enthused artist. The sleek contours and polished surface of the guitar have been elegantly captured here and the black-and-white final look adds an element of cool.*

D House Of An Admirer of Art
» **Alexandre Borges Faccenda**
3DA username Mondo 3D
Alexandre says: "This image was made to run various tests in mental ray. I wanted to see the result of blending the modern forms of the house with the rustic material surfaces applied."
We say: *Another imaginative piece of arch-vis mastery. We love the use of modern sculptures to give this environment a unique and inviting feel. The clever placement of curves brilliantly leads the eye around the interior and up the stairs.*

C

Image of the month

Primal Huntress Miniature

» **Hector Moran**
3DA username HecM
Hector says: "KeyShot test render of one of my miniatures done for *Kingdom Death*. It is based on concept art by artist Lokman Lam and was very a fun pin-up to make."
We say: *We love the details in this sculpt – the skull used as a helmet, for example, or the jawbone knuckle-dusters. The clean sculpting of the model is great too, of course!*

Plaza

» **Christopher Malheiros**
3DA username christophr
Christopher says: "This image shows the outdoor plaza space under an office tower. It was rendered with CINEMA 4D and post-production was completed in Photoshop. The design is by Dg-arq of Brazil."
We say: *This is expansive and modern arch-vis, given a refreshing and energising feel through the juxtaposition of synthetic glass with natural greens.*

LEGO Bike

» **Andrej Stefancik**
3DA username adozv
Andrej says: "The goal with this project was to make the viewer feel like the image was taken on a cellphone by an ordinary person. I wanted to capture the gray reality of these kinds of photos."
We say: *We love the imagination on display here, with the artist taking the LEGO creations loved as a child and transplanting them into the real world of adults.*

The Hungry Tortoise

» **Luke Panayiotou**
3DA username LukeP
Luke says: "I love animals and nature, particularly reptiles. I wanted to achieve a lot of detail in the model, both sculpted and textured. I'm really pleased with the outcome. I used Maya, ZBrush and After Effects."
We say: *Tackling nature can often be almost as difficult as humans – there's so much detail to get just right. Luke has done so commendably in this image, though; note the fine, rough texturing around the tortoise's head.*

Have your say

Email, Tweet or get in touch with us on Facebook to share your thoughts, opinions and proudest projects

Top tweets

Get involved... @3DArtist

@3DArtist joins the CGTrader.com Weekly Challenge! Check it out for the rules and to take part www.cgtrader.com/challenges/weekly.

Image of the Day is *Pa090183* by DeviantArt user !petromorozov.

@harriozpot Beautiful...

On the Wall

Facebook.com/3DArtistMagazine

Check out this hulking sculpt that Blur Studio's Jason Martin created for his ZBrush demo at SIGGRAPH (see right). Amazing work!

Chris Jacques Man I have to learn ZBrush. The stuff that artists do with it...

Martin C Barck This is totally sick!

Jose Soto I wonder how long it would take him to put on his gear? Or does he have gnomes helping him out? Really great work!

Craig D Jones Dude probably has a massive case of athlete's foot.

If you want to have your work or thoughts displayed here, get in touch with us via email at **3dartist@imagine-publishing.co.uk**, via Facebook at **facebook.com/3DArtistMagazine** or on Twitter **@3DArtist**

Social media images of the month

Close-up portrait **Facebook likes** 164
» **David Moratilla Amago** • **3DA username** dmoratilla
David says: "I wanted to create a natural and realistic portrait with a photographic approach. The base modelling was completed in Maya, texturing in Photoshop/BodyPaint, with ZBrush for refining the model and detailing skin. The hair was created with Shave and a Haircut and shaders_p, hair_TK. The fur was created using Maya Fur."

Barbarian **Facebook likes** 406
» **Jason Martin** www.believerdeceiver.com
Jason says: "This character model was initially created for Pixologic to demonstrate ZBrush's powerful features and it was showcased at SIGGRAPH 2013. I've always wanted to do a heavily stylised fantasy piece and a barbarian just kept knocking at the door. It seemed a great fit to show off ZBrush's robust toolset."

'ESPERO? (HOPE?)'

Hi 3D Artist, I've just released the short film we've created during this last year at the NCCA, titled 'ESPERO? (HOPE?)'. In order to produce it, I worked with two other people, Yifan Hu and Henrik Linnes, who are also working with me on our team's project for the BFX Visual Effects Competition project. I'd really like to share our film with you. It can be seen at tinyurl.com/3DAEsperoHope. Thanks!

Simone Giampaolo, via email

Beautiful, simple, effective... and funny to boot! It's always inspiring to see shorts like this from such talented students. You can also see what Team Poseidon came up with for the BFX Festival, along with the other teams, at www.bfxfestival.com/bfx-final-films-2013.

YOUR TOP WALL POSTS

Nebbia in Arrivo
» **Gregory Rogers**
3DA username Gallystops
Gregory says: "This was created during the advanced course at State of Art Academy. I wanted to think outside the box, as the arch-vis industry can seem so stagnant at times. iToo Forest Pack pro and Photoshop were crucial."

Ant
» **Marcello Baldari**
3DA username Marcello Baldari
Marcello says: "This was the result of me working on a photorealistic exercise on an organic model. The sculpting was done in ZBrush and rendering in KeyShot."

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PROFESSIONAL VFX SECRETS: ELYSIUM

Vancouver-based Image Engine continues its District 9 collaboration with director Neill Blomkamp on his new film, Elysium

Words: **Joe Nazzaro**

Although it's been working in visual effects since 1995, it was on the 2009 sci-fi epic *District 9* that Vancouver-based studio Image Engine truly made a name for itself. Delivering VFX shots almost indistinguishable from reality – such as the massive floating spacecraft over the city of Johannesburg, or seamlessly compositing the craft's one-time alien inhabitants into the slums of the film's namesake – Image Engine delivered on a job that established it as a force to be reckoned with.

Since then the studio has completed work on such films as *Zero Dark Thirty*, *The Thing*, *Immortals* and *Fast & Furious 6*. Now, however, Image Engine has reteamed with *District 9* director Neill Blomkamp, setting about work on the futuristic action-thriller *Elysium*. The movie takes place in 2154, a time when the wealthiest citizens live on an orbiting space station, while the rest of the population remains stranded on a heavily overpopulated and ravaged Earth. It's a film truly awash with stunning sci-fi effects, from the Elysium space station itself to the incredibly lifelike droids that patrol it.

We spoke to VFX supervisor Peter Muyzers, VFX producer Shawn Walsh and associate VFX supervisor Andrew Chapman to discover just how the team at Image Engine brought this ambitious and visually stunning world to life.

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> These droids were going to be seen in every possible type of framing, so we really had to go to town on the build

Shawn Walsh, VFX producer, Image Engine

Professional VFX secrets: Elysium

Design decisions

Creating a design aesthetic for a futuristic-genre film can be hugely complicated in terms of the number of players involved, including the production designer, art department, private concept artists and various in-house teams.

"On *Elysium*, the central stepping-off point was Neill's relationship with Weta Workshop," explains Walsh. "He had formed a close relationship with them on *District 9*, and *Halo* previous to that, so he had a real connection with them. What happened from a production standpoint was that Philip Ivey, the production designer, was also in New Zealand, so during early development of the film Phil's group in the art department was generating locations that weren't necessarily being imagined by Weta Workshop. It was almost like Neill was controlling scopes of work, so he would say: 'Christian Pearce at Weta Workshop could do a great design for the Raven, so let's get him to do that, but Phil will design the grounds around the mansion that the Raven crashes into.' He would sort of split things up like that."

> "Having worked on District 9 where we did some amazing creature work, we felt we could do that with one hand tied behind our back... The big challenge was in the environmental work"
>
> **Andrew Chapman,** associate visual effects supervisor, Image Engine

WELCOME TO ELYSIUM

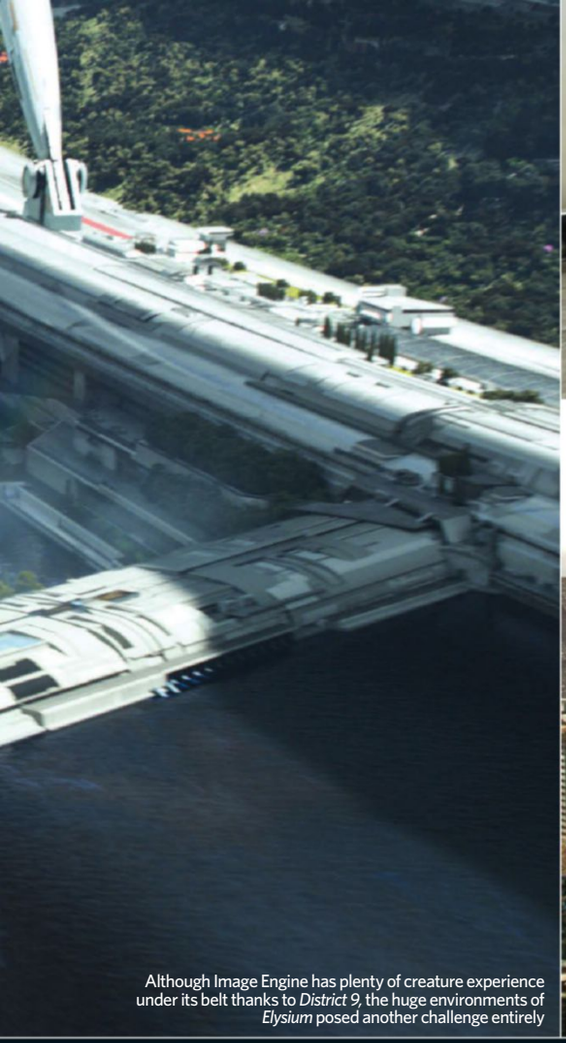
The path to *Elysium* began while the Image Engine team was still working with Blomkamp on *District 9*. "Neill always has nine different ideas that he's cooking up at any one time," says Walsh. "So as he became comfortable with us, it was quite natural to start talking about other projects. He showed us his initial pitch work for *Elysium*, which was a much different concept at the time that ultimately evolved into this project going forward."

"We also knew going into it that this was going to be a much bigger project than we wanted to handle entirely in-house," continues Chapman. "One of the cool things about Image Engine is it's one of the last remaining mid-sized companies where you actually know everybody. However, taking on a project like *Elysium* means you've got to be realistic when there are some things you should be outsourcing, so you can concentrate on and do a better job with the things that you decide to do internally.

"One of the blessings in being involved very early on, is we got to identify challenges or things that fit in very well with our existing team, our tools and so on. Breaking down the work as a whole, we divided it up into droids, vehicles and environmental work as the three main chunks. Having worked on *District 9* and a few other projects where we did some amazing creature work, we felt we could do that with one hand tied behind our back. Vehicles are also relatively straightforward, because once you've built a good asset, shots tend to go fairly smoothly, so we knew the big challenge was in the environmental work. That's where we concentrated a lot of our R&D efforts in terms of building the layouts and environment tools."

"As we started to narrow down what we felt Image Engine could handle in-house and what could be manageable if we went to somebody in a sub-contract situation, we ended taking on the work I would say was the most R&D-centric or asset build-centric," says Walsh. "We took on the monster CG builds and design work in a lot of cases, accepting work from the Weta Workshop team and building what they had designed. Neill looked at things once they were in the realm of CG, so he'd add or tweak and push them even further.

"As those key concepts became more solid with respect to visual effects, we were able to say 'Okay, this is on the Image Engine plate' and came up with a scope of work that was about 70 per cent of all of the effects work in the film that was housed within Image Engine," Walsh continues. "We tried to go to as many BC [British Columbia] companies as we could, that we felt would qualify for the work and ultimately ended up going to Method, MPC and The Embassy locally for a couple of hundred shots."



Although Image Engine has plenty of creature experience under its belt thanks to *District 9*, the huge environments of *Elysium* posed another challenge entirely

Elysium's reimagining of a 2154 Earth is a sobering sight to behold, the very foundations of our civilisation tearing at the seams

ENVIRONMENTAL CONCERNS

Unsurprisingly, a massive amount of work went into designing and building the film's utopian space station, inside which residents live a life of luxury. "Neill had a very clear group of reference images," recounts Walsh. "He also had some basis of knowledge from the Jet Propulsion Lab, the Stanford Torus and some concepts from Popular Mechanics that defined how you would go about building an orbital habitat.

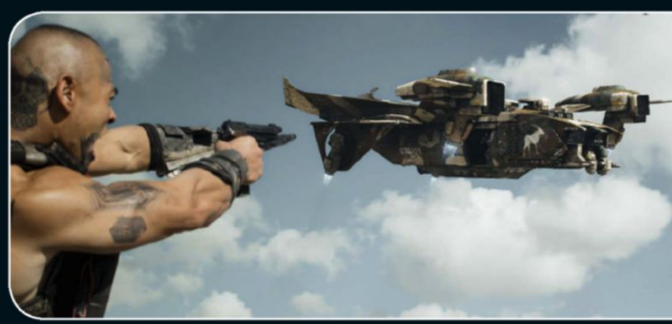
"Syd Mead was the person who really nailed the feeling of Elysium the most," Walsh continues. "Neill asked him to do some conceptual artwork, which created the right tone, but it wasn't necessarily an instruction manual for constructing the CG build. As a result, Peter Muyzers put together an in-house art department here at Image Engine that designed every little detail about the surface and structure.

"One of the great things about having Neill in Vancouver for three or four months during post-production was that we could see him pretty much every day, so we were really able to get the design and proportions of Elysium nailed down, whether it was the inner wheel or the exterior superstructure. We then broke them down for individual design work, where we kept tweaking them until Neill was happy."

"The design challenge of the ring was enormous," agrees Chapman. "We were building a self-contained world that was two kilometres across and 125 kilometres around, so it was a huge task.

"Then you start drilling down into things, asking questions of the design. How many spokes does it have? Where do the ships arrive and leave from? What does the outer surface look like? Going down below the surface, how many municipal buildings are there versus residential? Are there hints of transport infrastructure and things like that? What does the terrain look like? If you think about it in terms of building this thing for real, you have teams of dozens if not hundreds of architects and town planners involved with designing this world. Just because we were doing it in the computer doesn't mean that work somehow magically happens. People still need to sit down and figure out all of that stuff."

Image Engine also had to create areas of a ravaged 2154 Earth. "We shot for about a month just outside Mexico City, in the world's second-largest landfill, which was a sobering experience, but we came away with all the stuff in-camera, so we didn't have to dress up a lot of those locations," recalls Chapman. "Most of the future Earth work we did tended to be sticking smoke plumes in the distance, vehicles flying overhead and dropping the LA skyline into plates whenever we needed to remind everybody it was not just Earth, but also near Los Angeles."



In *Elysium*, Kruger's Raven has been extensively built-upon, modified and augmented. It's extra layers of VFX detail such as this that make Blomkamp's worlds feel that much more authentic

Although *Elysium* is undoubtedly a VFX-heavy film, it's nevertheless full of real-life shooting locations – such as a huge landfill situated just outside of Mexico City – that ground the action in a sense of realism

Professional VFX secrets: Elysium

DETAILING THE DROIDS

With the citizens of Elysium living a utopian lifestyle, many of the mundane day-to-day tasks have been delegated to droids. "We knew these droids were going to be seen in every possible type of framing, from extreme close-ups to wide shots of multiple droids, so we really had to go to town on the build," says Walsh. "It was all about constantly increasing detail until we felt we were in a zone where you couldn't see any more detail if we added it."

"Every shot involving CG droids had a stunt performer in a grey Lycra suit," Chapman says. "This gave Neill and his cameraman something to shoot with and direct on the day, but it also meant he had all of that material to edit with.

"Before we had any of the droid shots turned over to us in post, Neill already had an editor working on those shots, so he knew they were exactly what he wanted. From our point of view, we had perfect performance and lighting reference, which led to an efficient process," Chapman continues. "Because our animators had already been through a few projects like this, they were pretty quick at the initial lineup animation, so those shots were all manually hand-animated and matched by eye, as opposed to automated tracking of the grey-suited performers, but we were still able to turn them around very quickly.

"We also ended up going through a redesign process with the droids early on in post to augment them with all this gadgetry, as well as slimming them down a bit. They were starting to come across a bit too much like burly American football players, so Neill wanted them slimmed down to look more lean and mean – more like SWAT team droids," Chapman adds.

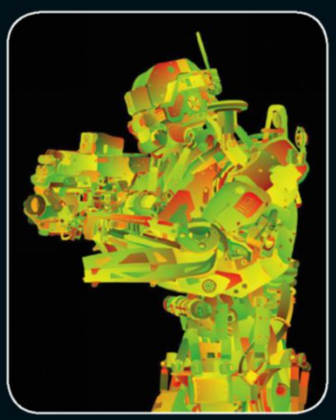
> "You can see all the scratches and every little bolt and decal, so we're very happy with the way the droids turned out"
>
> **Andrew Chapman,** associate visual effects supervisor, Image Engine

The droid hierarchy

Although the droids of *Elysium* are all built from the same basic geometry, there are several different models created for various functions. "There are five basic types of droids," lists Chapman. "The Earth droids are green, really banged up and scratched, so they look like they've been on Earth for 20 years and nobody has maintained them in any way. They're on Earth to keep the population in check.

"We had the shiny red Homeland Security droids that keep order on Elysium rounding up the illegal immigrants, which is their main task. Carlyle has his own personal droids, which Neill referred to as the Gucci droids, because they're covered in repeating gold and black patterns, so they look shiny and expensive. There are also the medical droids, so while they are all based on the same geometry, it's the look and texturing that distinguishes them. During our second round of redesign, we went to town and detailed them up.

"There are a few shots where the camera goes in tight on one section of a droid and it still holds up full-frame, where you can see all the scratches and every little bolt and decal, so we're very happy with the way the droids turned out."



As with the Prawns of *District 9,* having real people on the set gave the actors someone to interact with and the VFX teams plenty of invaluable lighting reference

When animating, the team at Image Engine manually keyframed the action according to the actor's movement on-set, rather than automating the process

WE DON'T NEED ROADS

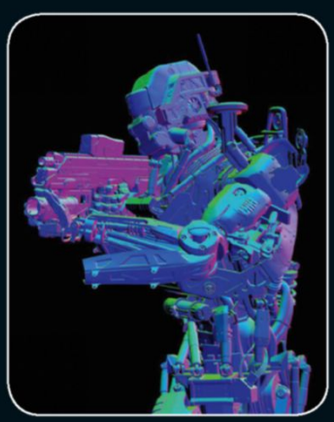
Another major responsibility for the Image Engine team was the creation of countless spacecraft, each of which added to the rich and engrossing nature of Blomkamp's world. "A lot of our vehicles were background traffic stuff," agrees Chapman. "On Elysium people don't drive cars; they fly around in their shuttles, so it's a classic sci-fi trope to see these flying vehicles buzzing around.

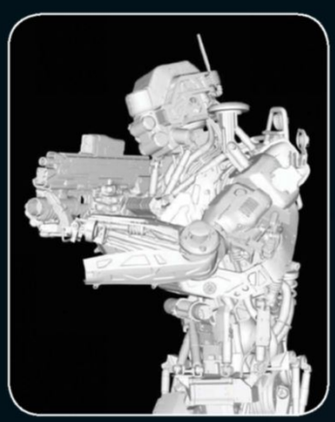
"The focus for our vehicles was the Raven, which is the paramilitary vehicle Kruger uses in the film. Due to production pressures, you might see the guys getting on or off the Raven, where we didn't have a physical partial build there on the day. We were just shooting against a flop of greenscreen and since the camera was getting within a few feet of it, we were biting our knuckles, hoping it would work out. In the end we're happy with the amount of detail we were able to throw in."

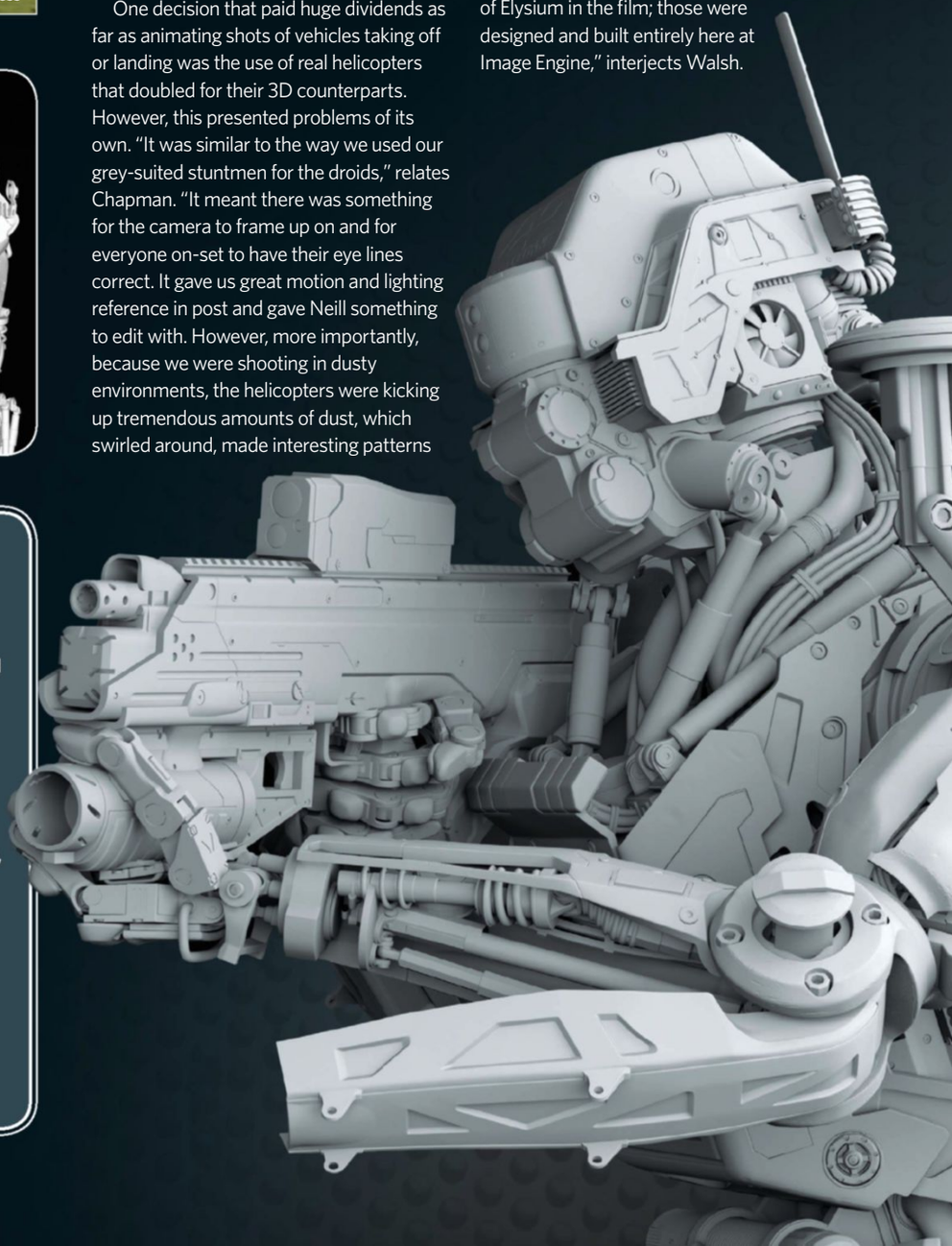
One decision that paid huge dividends as far as animating shots of vehicles taking off or landing was the use of real helicopters that doubled for their 3D counterparts. However, this presented problems of its own. "It was similar to the way we used our grey-suited stuntmen for the droids," relates Chapman. "It meant there was something for the camera to frame up on and for everyone on-set to have their eye lines correct. It gave us great motion and lighting reference in post and gave Neill something to edit with. However, more importantly, because we were shooting in dusty environments, the helicopters were kicking up tremendous amounts of dust, which swirled around, made interesting patterns that interacted with everything on-set.

"That was a double-edged sword, because on the one hand we had this great interaction with everything in the live-action plate, so when we dropped in our CG vehicle we got a lot of that stuff for free. The other side of it is it's incredibly difficult to integrate CG into a dust swirl like that. We had to have some very talented senior compositors who were somehow able to composite something within a dust cloud, as well as our effects artists generating our own dust elements to match them as closely as possible, which we could layer back over the top. So we ended up with great reference and interaction in the plates and then we could embed the CG within it. This resulted in a gritty reality to those shots that we wouldn't have had if we'd just shot them clean."

"Also, the Raptors, which are the red vehicles that you see landing on the surface of Elysium in the film; those were designed and built entirely here at Image Engine," interjects Walsh.







The Raven crash

The best visual effects are quite often a combination of traditional and cutting-edge techniques. Case in point is the Raven vehicle crash-landing on Elysium. "Any time we get started with something real as the basis for our work, we are on board with that," agrees Chapman. "We shot our Raven miniature at Kerner Optical, which was one of the last jobs it did before shutting its doors. It was the old ILM model shop back in the day, doing miniature practical effects, so it had a long history in the business. Unfortunately it recently shut its doors to reopen as 32TEN Studios, where we returned to shoot some of the pyro elements for this film.

"The Raven crash started out as a miniature, which had to be integrated into the full-sized mansion set here in Vancouver," continues Chapman. "The mansion itself was only built up to the first floor, so we had to extend it in CG and embed all of it within the world of Elysium. In the end there were three layers to that shot, which made it a really interesting chunk of work."

Professional VFX secrets: Elysium

> When we approached the all-CG space shots, we knew they had to fit in with the flavour of the rest of the film
>
> **Andrew Chapman,** associate visual effects supervisor, Image Engine

When populating the inner rings of Elysium, the VFX team had to think as if they were the station's actual architects

PARADISE FOUND

In addition to their three main areas of work on *Elysium*, the Image Engine team found themselves working on a number of minor areas of the film. "When you take on an entire film like this, you end up with this huge spread of miscellaneous bits and pieces, from make-up fixes to burning tattoos into people, so there was a real spread of work," claims Chapman.

"Given Neill's gritty, down-to-earth visual style, when we approached the all-CG space shots, we knew they had to fit in with the flavour of the rest of the film. One of the tricks we used was to take the approved animation of these all-CG shots of spaceships flying by to a motion-capture studio here in Vancouver called Animatrik," Chapman continues. "We had a virtual camera that panned around the CG scene as the ships flew by, so we operated that camera and recorded its movements through motion capture. The end result was we got a natural bump and jitter that we dropped back into those shots, which fit in with the overall camera work, bringing more reality to those shots. As good as we think we are at making stuff up from nothing, it's never as successful as going out there and capturing something for real."

"We put the camera on the shoulder of one of our lead animators, Scott Kravitz," says Walsh. "He essentially re-filmed a virtual shot with the virtual camera, which gave it a wonderfully handheld organic feel. Any key-framer would have a hard time matching what a virtual motion-capture camera feels like, because there are just so many microscopic kinds of aberrations that make the camera feel that much more real."

With *Elysium* now making its way across the globe, the Image Engine team is very much pleased with its impressive contribution. "Personally, I'm happiest that Image Engine was responsible to the VFX on the film," reflects Chapman. "Managing the overall project and working really closely with Neill was the best thing we did. It's increasingly rare these days to have that close a collaboration with a filmmaker."

"I think I'm most proud of the overall scope of the work, the level of accomplishment and consistency of the quality level of the film," adds Walsh. "It was a huge leap of faith for Neill to come back to Image Engine with such a broad scope of work and to trust Peter Muyzers and myself to helm the visual effects on the film.

"We were also able to bring a number of different players to the table who were more than happy to work with us and with Neill; all of the subcontracted vendors – including Whiskeytree, ILM, MPC, The Embassy, Method Studios. Each company created some fantastic-quality work.

"But the heavy lift was at Image Engine, where we completed more than 70 per cent of the work on the film. We've never done a project of this scope and scale before, so being able to complete it at the level of quality that we were able to pull off is really the thing I'm most proud of."

Syd Mead's influence has been felt through cinema for years, with the futurist working on such sci-fi classics as *Alien*, *Blade Runner* and *TRON*

The Mead influence

One of the world's top visual futurists, Syd Mead, played a pivotal role in the design of the Elysium structure. "There were some great sketches that Syd had done in the 70s, which came out of a NASA project to visualise what was referred to as a Stanford Torus," offers Chapman. "It was a study at Stanford about whether or not it was possible for human beings to live on a structure like that.

"If you look at those books from the 70s of what the future looks like – all clean and perfect, with everybody well-dressed and fit as the spaceships fly by overhead – you are on the surface of such a ring," Chapman continues. "You see row after row of perfect crops growing in futuristic buildings, so those early images from Syd were very inspiring in terms of what Neill wanted to see inside the ring. He also wanted a combo of that with Beverly Hills or the Hollywood Hills, so we had to transport that California terrain and building layout into this Stanford Torus environment. It wasn't just a technical exercise to put all of that stuff inside a ring and make it photorealistic; Neill had a specific idea what it should actually feel like."

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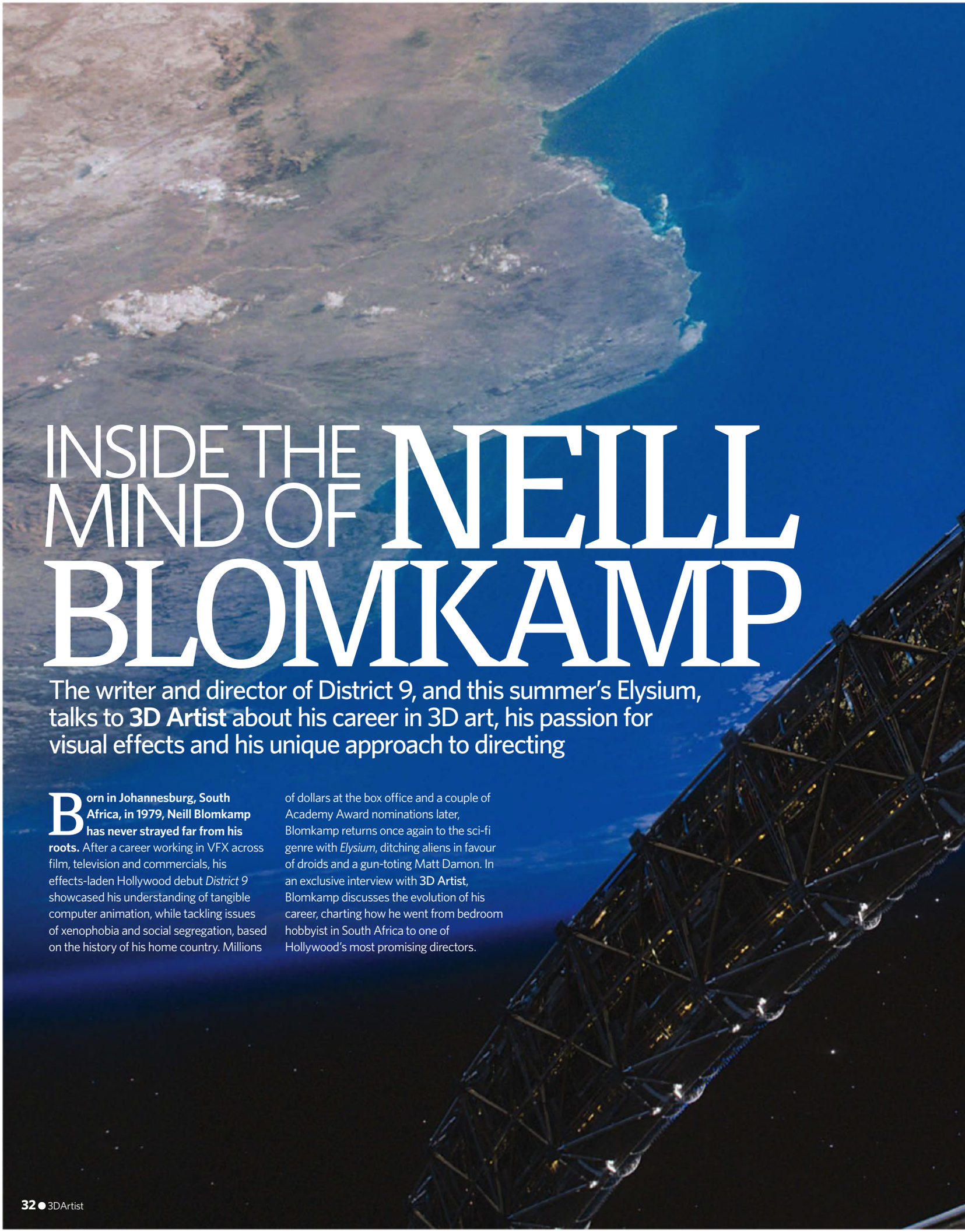

INSIDE THE MIND OF NEILL BLOMKAMP

The writer and director of District 9, and this summer's Elysium, talks to **3D Artist** about his career in 3D art, his passion for visual effects and his unique approach to directing

Born in Johannesburg, South Africa, in 1979, Neill Blomkamp has never strayed far from his roots. After a career working in VFX across film, television and commercials, his effects-laden Hollywood debut *District 9* showcased his understanding of tangible computer animation, while tackling issues of xenophobia and social segregation, based on the history of his home country. Millions of dollars at the box office and a couple of Academy Award nominations later, Blomkamp returns once again to the sci-fi genre with *Elysium*, ditching aliens in favour of droids and a gun-toting Matt Damon. In an exclusive interview with **3D Artist**, Blomkamp discusses the evolution of his career, charting how he went from bedroom hobbyist in South Africa to one of Hollywood's most promising directors.

> I CARE ABOUT VISUALS SO MUCH MORE THAN I DO ANYTHING ELSE, ANY OTHER FORM OF ARTWORK. FROM THE TIME I WAS A TODDLER, I'VE BEEN OBSESSED WITH IMAGERY

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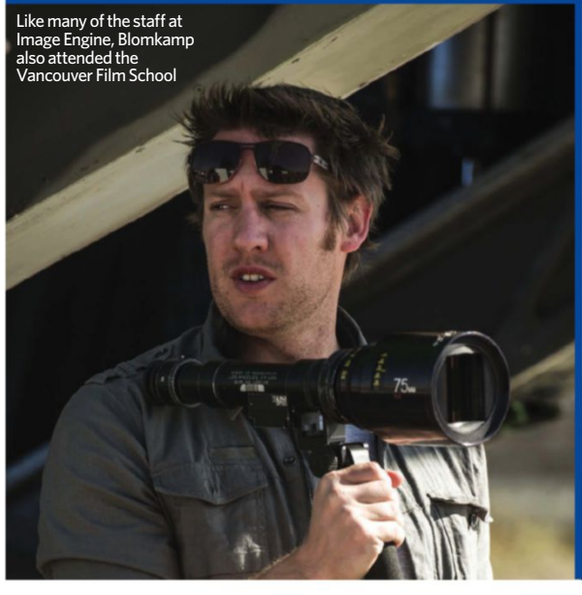
Coming from a VFX background means that striking images form the core of Blomkamp's work

District 9 set a new standard for sci-fi VFX, and presented an exciting, realistic take on the genre

Like many of the staff at Image Engine, Blomkamp also attended the Vancouver Film School



How did you initially become interested in visual effects?

I care about visuals so much more than I do anything else, any other form of artwork. I hate writing, I hate all that s**t. When I was a kid, from the time I was a toddler, I've been obsessed with imagery. I think even before I was a teenager I knew that I wanted to try to get into special effects, model-making, gore and prosthetics, miniatures – I was obsessed with miniatures. So, what happened was I started dabbling in it and then I saw *Terminator 2* and *Jurassic Park* within a year of each other and that changed my mind about all that stuff. All of a sudden it was the most interesting stuff in the world. I was 14 and I had a personal computer – I think it was a first-generation Pentium – and I got TrueSpace, this old-school 3D graphics software. I started messing around in there and found it the most creatively rewarding thing I had ever done in my life. Then I got into LightWave and I was creating stuff all the time while in high school.

When did you really start pursuing 3D visuals and VFX as a career?

By the time I moved to Canada I really knew what I was doing. Sharlto Copley had a company – he was a few years older than me – so when I was in school I was producing computer graphics for that. Those were not visual effects, those were entire animated pieces. When I got to Canada I went to Vancouver Film School... I just went to its 3D animation course – I don't think it had broken out into visual effects back then in 1998. Out of that I got hired by a company called Rainmaker – that has had about 500 different name-changes over the years, I think it's currently called Massive. That was my first proper job. Following that I was a visual effects artist, putting CG elements into background plates. At that point we were doing everything – animating, lighting, rendering and modelling. I still really like modelling. That was kind of my history. Then I quickly realised I wanted to direct, so I quit full-time visual effects and I started to use computer graphics in my own f****d-up short films that I was doing.

Did you always aspire to get into directing through a visual effects route, or was it just something that happened organically?

Yeah, it came later. It was like this progression. When I lived in South Africa, even though I was constantly using computer graphics, I felt like I was going to grow up and be an accountant. It's almost impossible to get jobs in this field. Then when I moved to Canada and went to film school, I thought: 'Wow, I can actually work getting paid to be a visual effects artist', which blew my mind. Then, when I was working as a visual effects artist, I was like: 'I think I can actually direct movies.' Then my focus changed.

Do you think you had an advantage over other directors, as you were moving into the industry with an understanding of VFX?

At the time I started almost landing feature work, all the studios were looking for were young filmmakers coming out of VFX. There was so much visual effects happening in film, they thought it was a way forward... These older, second-generation, Hollywood directors from the 70s and 80s didn't know s**t about VFX, they didn't know what they were doing. This kind of younger, hotter group of VFX artists turned directors could help pave the way for them to make films, use the effects well and do it cost-effectively. I think in the mid-2000s it was unbelievably beneficial for a young director to come out of VFX. I think in today's Hollywood that's not true anymore. It's still there, it still helps, but there are now so many short films with VFX in them.

A history in VFX can actually impact on you in various ways. The challenges that such a background really creates are: you've never worked with actors before, you've never worked with cameras before and you've never been on-set before. For many coming

Every small detail needed to be considered when creating Elysium

out of music videos, commercials or even theatre, those young aspiring directors are far better equipped to become feature film directors. The studios don't necessarily know that, though, so the negatives are on you. They are on you to work out how to solve them – such as knowing how to interact and actually direct on-set, which is very different to visual effects.

There must be benefits to directing on-set as someone with a background in computer animation, though?

On a core DNA level, the people who get into VFX are naturally going to be people who like images, who like movement and cinema. That's opposed to guys who really want to work with actors, who like theatre and story – those are very separate things. That's going to come out in your work and your approach is going to be influenced by that. That's the genetic make-up of who you are. Like, you're not going to find a compositor working at Weta who is enamoured with theatre and all he wants to do is theatre plays; it doesn't work that way, they're visual artists.

How hands-on are you with the visual effects on your films? You mentioned you still enjoy modelling; do you get hands-on in that respect?

No, no, it's so different. The level of the VFX that seem to be happening now, the way in which they're executed... I couldn't even fit into the pipeline. I'd have to learn new software – whatever the modelling software was – and I'd have to execute the models in a way that they're going to be textured and rigged in a way that's completely alien to me. I've been out of it so long and the technology is so much more advanced that I'd just f**k everything up. It's also not productive, it's not needed. When I was younger I used to think that sort of thing was essential. Now I don't. What's required is the director needs to be able to explain to the VFX supervisor *exactly* what they're looking for. It's not your job to get in there and mess things up. It's about being extremely decisive about what you want.

What were the unique visual effects challenges that* Elysium *posed?

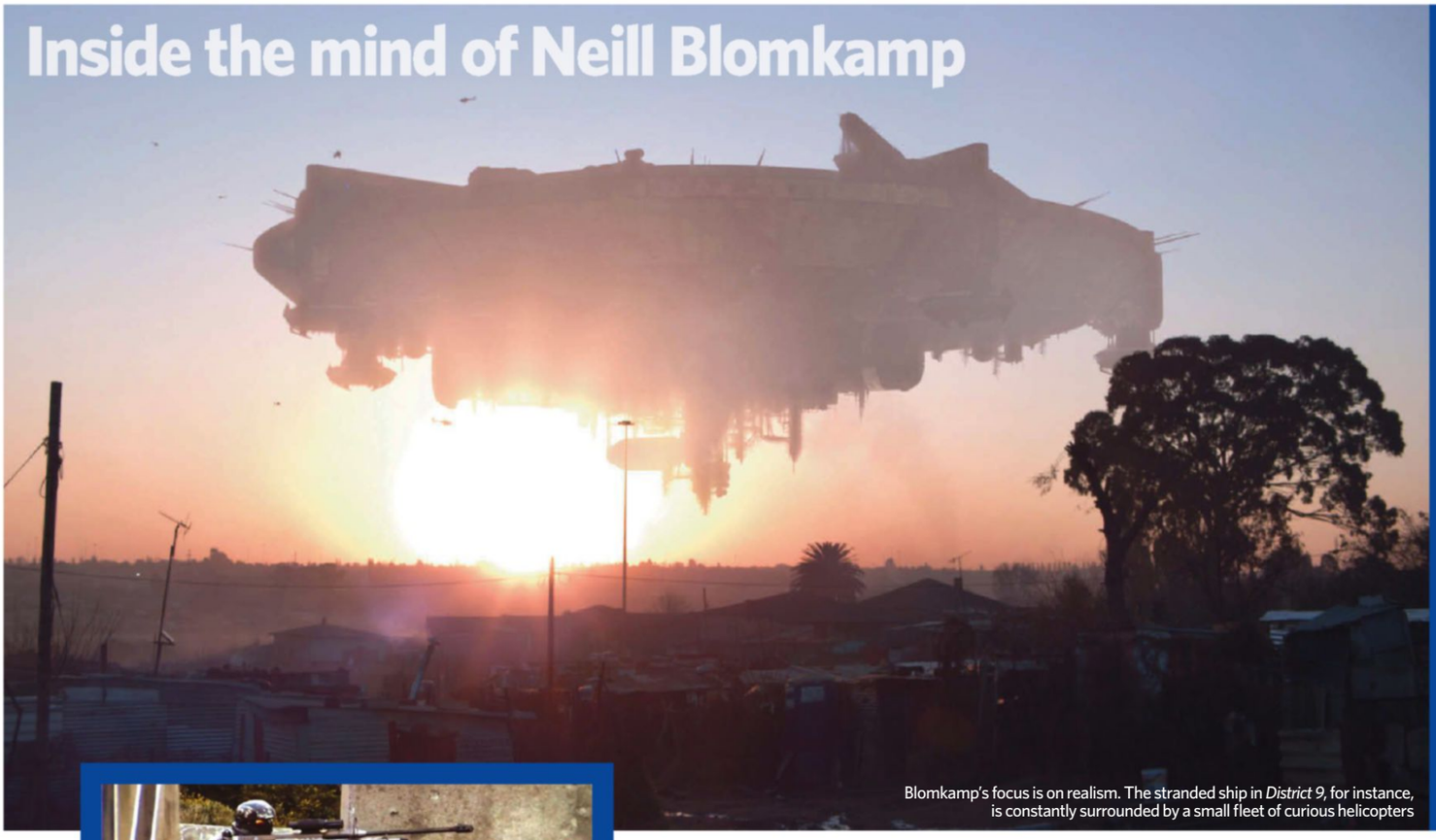
Basically, I think the most complex part of *Elysium* in terms of VFX was bringing the torus to life, for sure. The space station orbital torus was a whole other league of VFX for me. We approached the droids, the mechanical robots that we were switching out the live-action actors with, in the same way as in *District 9*. Image Engine has that kind of rotomation way of working down to a tee now. It's kind of like you could do it in your sleep, it's not that difficult. It's the same with spaceships flying around – it's not that hard. What all of that work is based on – droids, spaceships and everything else in the movie except for the torus – are background plates that have been filmed that have inherent light, shadow and contrast built into them. All of the decisions have been made for you; you just have to put the robotic droid in there. With Elysium, you're talking about a 100 per cent render of something. It's like a black bunch of pixels with nothing. 'Oh, OK, now we have to build the assets, so let's design that', which takes eons because it's like four-trillion triangles of polygonal density. Then it's like: 'What type of foliage is in there? What's the climate? What type of architecture is in there?' Build every single one of those elements and put them together and it looks wrong, but then it's like: 'Maybe it looks wrong because the lighting is wrong, because you never shot anything, so you don't have any reference for lighting. So what time of day is it? Exactly how many clouds in particular in the air do we want? Does it look real with less or more?' So bringing the torus to life was by far the most complex thing in the film.

> "THE DIRECTOR NEEDS TO BE ABLE TO EXPLAIN TO THE VFX SUPERVISOR EXACTLY WHAT THEY'RE LOOKING FOR. IT'S ABOUT BEING EXTREMELY DECISIVE"

How much of a step up was it from* District 9*, would you say?

It's a pretty big step up. I still think that the creatures in *District 9* look disgustingly good. They're so well rendered, executed and comped. In a sense, they're like bread and butter work – they were just done unbelievably well. It's just building the creature correctly, texturing it right and, importantly, lighting it correctly – which so rarely seems to be done well – and then

Inside the mind of Neill Blomkamp



Blomkamp's focus is on realism. The stranded ship in *District 9*, for instance, is constantly surrounded by a small fleet of curious helicopters

In 2007 Blomkamp directed 'Halo: Landfall', a live-action promo for *Halo 3*. Unfortunately, the planned *Halo* feature film never transpired

2003's 'Tetra Vaal' is a faux advertisement for third-world robotic police and the rough basis for Blomkamp's upcoming sci-fi comedy, *Chappie*

Blomkamp has worked on many advertisements during his career, including the mini movie for Adidas' Adicolor campaign, 'Yellow'

> "Everything is driven by visuals. Even when I was writing the script I was getting Weta to do concept art to capture the movie's tone"

comping it correctly. Once you get that down you can just repeat the process. The thing with the whole orbital space station is that you're essentially trying to build a photoreal asset that has a 100-kilometre radius and has to be photoreal at any point. It's a whole new level of insanity. But when we started to get it right, it looked so goddamn good. It looks so f*****g awesome on the screen that it's worth it.

Elysium itself is reminiscent of Halo's eponymous structures and obviously the work of Syd Mead. Where do you look for influence when writing? Is it a visual you have in your mind or does it evolve from the page?

It's definitely from visuals. I think everything from me is driven by visuals. I just really don't like words. Even when I was writing the script I was getting Weta to do two-dimensional concept art to capture the feel and tone of the movie. Then sometimes I would just get them to paint images, concept art, that had nothing to do with the script but to do with the world that the film takes place in and think: 'S**t, that's got to be in the movie', so I would change the script to fit that. Imagery first, always.

You mentioned compiling a graphic novel to illustrate the world of Elysium in pre-production. Does that also work as a functional guide for VFX?

Yes, but it's a happy by-product. The main reason for creating that particular book of images was to help me create that world. Those images were for me. So, it's like, I'm writing the script, I send stuff to Weta, I get back to writing the script, I come up with a different idea that isn't in the script, I get them to illustrate that and then I go back to writing. By the end of that process I have the script that is finished and I have a whole bunch of images that back the script up. From that point, they can be useful for actors, VFX, as well as costume and production design. That's really the reason to do it. When you start getting specific in VFX then you go off on a whole other tangent of research.

How do you make science fiction interesting and unique? What are the stand-out details that really make it work for you?

I guess, ultimately, I'm trying to make the movie for myself – I happen to be the demographic that goes to see the film, so I want to make a film that I would want to watch. One thing I really respond to is when the filmmaker has convincingly sold me on something being real when it isn't. I f*****g love that s**t. So, personally, what I'm trying to do is define an artistic or aesthetic look or feel that's driven by realism, by trying to make the audience believe 100 per cent that what they're seeing was filmed by a camera. That's kind of a slightly different thing from designing it to be 'X' – whether X is Gothic, picturesque or beautiful, or whatever the term is. My thing is realism. So the details and specifics about the visual effects can be anything, but in my case it's what is the most real thing you can include? The details should be: 'Is the vehicle heavily used? Is it new? What kind of licence plates and registration does the vehicle have? Where would that be placed? What's the engineering substructure to it?' Those are

Blomkamp relies on visuals to such an extent that he will even change a movie's script if a new piece of imagery excites him enough

the questions that I try to ask. Those details are the things that make me really enjoy visual effects.

Looking back at* District 9*, what would you say was key to making the aliens look realistic to the audience?

I think some of it's subconscious. I think the whole realism thing is so ingrained in me that I'm probably making choices that I'm not fully conscious of. But I think that with the conscious ones I'm just rational about it. 'What would this do? What would this look like? What would it cover itself in?' One example in *District 9* is where some aliens have random paint on them – they have the mottling and colouring of insects, but beyond that they have a path of blue paint on their back. Well, in some sort of racist, xenophobic attack some humans dumped paint on the alien. That kind of thing is outside of the realm of normal VFX, where it's something more like you'd see on a BBC show about xenophobia in South Africa than VFX in a feature film. I think the closer you get to that, the more you mess with the audience and the more it feels real.

Would you say you're more discerning as a director with VFX than others? Do you pour over the minute details?

I would say that's accurate, but I do it in a way that's efficient. I think you can do that in a way that can yield a good product, but is inefficient. Where you're doing it in a way that isn't conducive to the process of visual effects and you're treating it much more like an organic process. But if you understand the workload that comes with what your request is, then internally you can vet what you're asking for, prioritising essential things rather than burning out the entire VFX crew on stuff that isn't important.

Are there any recent VFX tools that particularly excite you?

There is no single thing I can point at, but what I find myself looking at in general when I go looking for anything related to VFX is anything to do with particle simulation. It's not even necessarily the software, it's that the hardware is now getting to a point where you can have 30-million independent particles being simulated doing 'X'. I find those simulations unbelievably interesting, where the computer power is now getting to the point where it can simulate nature in a fairly confined, small area.

Has there been a film recently that has impressed you in terms of VFX?

I think that *Pacific Rim* was impressive, especially in terms of the volume of stuff happening on screen. It was pretty amazing.

Are you going to continue focusing on sci-fi after your next project,* Chappie*, or will you explore other genres?

To be honest, after *Chappie*, the only thing I know I want to do is a very f****d-up comedy that doesn't rely on VFX much. After that I don't know. I definitely would like to get into fantasy at some point. I went down the road of sci-fi but I feel like fantasy is just as much my thing. That would be very cool, but I honestly don't know if that's going to happen. After *Chappie* I just don't know. I have this one comedy, and then we'll see what's next...

Career highlights

ELYSIUM | 2013 | FILM
For his sophomore production, Blomkamp returns to sci-fi armed with a bigger budget to create the world of Elysium – a utopian space station upon which Earth's elite reside. It's the director's biggest technical challenge to-date, creating the eponymous torus to appear functional, while also handling a stellar cast including Matt Damon and Jodie Foster.

DISTRICT 9 | 2009 | FILM
Neill Blomkamp's Hollywood debut was an awe-inspiring sci-fi blockbuster, mirroring the period of apartheid in South Africa's history and adapted from Blomkamp's earlier short film 'Alive In Joburg', wherein aliens find themselves marooned and segregated after landing on Earth. With a modest budget of $30 million, Blomkamp employs a documentary style to ground the visual effects, making for a uniquely tangible invasion story.

RAIN | 2006 | COMMERCIAL
For a series of television commercials created for Gatorade, Blomkamp took the idea of hydration and major US sports and combined them to make a highly evocative series of adverts that involved athletes spawning from within sporting equipment. They offer the slightest hint at the sort of body-horror effects that he'd later employ in *District 9*.

YELLOW | 2006 | SHORT FILM
A short film produced as part of an Adidas advertising campaign; once again Blomkamp conveys realism through a grounded approach to VFX. Huge whirling machines and bio-mechanical humanoids star in this story of a rogue globe-trotting robot who finds itself obsessed with human culture.

ALIVE IN JOBURG | 2005 | SHORT FILM
The short film that would later be adapted in *District 9*, Blomkamp wrote, directed and produced the visual effects for the tale of aliens living in South Africa. It attracted the attention of *Lord of the Rings* director Peter Jackson, who would later produce *District 9*.

ALIVE WITH TECHNOLOGY | 2004 | COMMERCIAL
For a commercial advertising the Citroën C4, Blomkamp envisioned the car literally coming to life. Transforming the car into a humanoid robot, while maintaining the minute detail, the famous car advert would later serve as inspiration for bringing the world of *Transformers* to life on the big screen.

VANCOUVER VISION

WE TALK TO VANCOUVER FILM SCHOOL'S FACULTY AND STUDENTS TO LEARN WHAT MAKES THE INSTITUTE SO VERY SPECIAL

Parker Davidson
Student

Marty Hasselbach
Managing director

Casey Kwan
Senior instructor

Maia Neubig
Student

Marianne O'Reilly
Head, Animation & Visual Effects

Macro – Maria Esther Lopez Rodriguez

> When graduates reach a level of success where they become a household name like Neill Blomkamp, or when you see that you had upwards of 50 grads working on a movie like Elysium, that is certainly a high point
>
> **Marty Hasselbach, managing director**

The Vancouver Film School is based in downtown Vancouver, with an eye on the mountains and both feet firmly planted in the film and games community it feeds. VFS offers 13 courses, employs over 450 staff and has more than 1,000 students at any one time, of which 50 per cent come from outside Canada. Probably the most impressive statistic is that graduates from the Animation & Visual Effects department have worked on the 17 highest grossing films of all time.

VFS is not a traditional dry-theory university, or a training centre where you can learn one package but little else, or even just a creative space where people play at making movies. The School prides itself solely on the business of creating "confident, skilled digital artists that are production-ready", as managing director Marty Hasselbach puts it.

"From VFS's inception in 1987 we have focused on entertainment-related educational products," says Hasselbach. "For nearly three decades, it has become the world's pre-eminent centre for delivering quantifiably superior educational curriculum in highly accelerated time frames." Courses are a speedy 12 months and they don't come cheap, but the list of alumni is certainly backing up Hasselbach's point.

"It's very rewarding to know how many lives have been impacted by the School," continues Hasselbach. "When graduates reach a level of success where they become a household name like Neill Blomkamp, director of *District 9* and *Elysium*, or when you see that you had upwards of 50 grads working on a movie like *Elysium*, that is certainly a high point."

Rather than running year to year, VFS operates a rolling intake scheme, with between 250 and 270 students graduating from the Animation & Visual Effects department every year. The department runs three different courses: Classical Animation (est. 1994), 3D Animation & Visual Effects (est. in 1995) and Digital Character Animation (est. 1998). The first two are year-long courses, with Classical Animation requiring an awful lot of drawing, and 3D Animation & Visual Effects covering all aspects of the process and then enabling students to specialise for their final reel. Digital Character Animation is a six-month course designed to take people from the Classical Animation course into the digital realm. But whatever you study at VFS, the standards and the demands are high. Or, as Hasselbach recalls one of his students put it: "The curriculum here is fantastic, but it's tough. You will definitely have to strap on your big-boy pants for this one, because it's a wild ride."

Vancouver vision

Software, streaming, storytelling and success

Marianne O'Reilly, head of the Animation & Visual Effects department at VFS, stresses that all three of her programs emphasise story, pre-production and production. "All the students in our programs leave with their own distinct short film or final reel, complete with sound design and ready for award submissions and posting," she says. "Our goal is to create competent and confident digital production artists, with an approach that is based on story as well as hard and soft skills, which I think is what makes us different from other schools. Story enables our students to better understand the production process and what their role in it is. In addition, all of our students create their own individual and unique reels in a team-based environment."

Casey Kwan, senior instructor of Concept & Story, adds that it's this approach that makes VFS grads so production-ready. "On one level it's about core technical skills, but on another it concerns what we call the soft skills. Being able to do this or that in Maya or NUKE is one component of a production artist's success. The second component is being able to work as a team player; understanding how to take direction and the paramount importance of communication. These so-called soft skills are what will enable an artist to retain their jobs and advance in their careers."

Of course, leaving with a successful reel is vital too, and it's the fact that students can work with their peers from all other programs in the School that really makes this possible. "It's no surprise that there is added value and experience gained from working together with other creative types," Hasselbach explains. "It's hard to avoid collaborating at VFS, because you are living and breathing your program for a year with a thousand other like-minded individuals, all doing the same thing. The facilities are set up in a way that facilitates interaction and co-operative support."

At VFS the prevalent attitude is that the software is a tool and while the students have to be proficient with those tools, it's not just about knowing which button to push. On the 3D Animation & Visual Effects program, students stream into one of three specialities: visual effects, modelling, or animation. This puts them in a group of between eight and 15 students, from the original cohort of 32.

"We start the group all together for the first four months learning technology through Maya and NUKE, team building, the history of animation and VFX, design, visual storytelling, camera basics and more," explains O'Reilly. "Though the students move to smaller specialised and advanced classes in their stream during the months four through 12, they continue to work in pre-production classes and the production

It's not only talent that VFS is looking for when selecting students, but also passion

CURRENT STUDENT PARKER DAVIDSON DISCUSSES HIS EXPERIENCE AT VANCOUVER FILM SCHOOL

What inspired you to apply to the School?

I grew up in Poplar Bluff, a small town in Missouri. It was there in high school that I picked up 3D modelling in Blender as a hobby. I worked on mods for videogames and small projects in my spare time and grew to love it. After graduating from high school I moved to Nashville, Tennessee where I attended the Art Institute for a year and a half. Honestly, I think what inspired me the most to start the course was the gorgeous work that was coming from VFS. All of it was so creative and energetic. Both the technical and artistic skills of the students were incredible, especially from a one-year course.

VFS has lots of very impressive graduates, is that inspiring or intimidating?

It's a little of both. But that's what motivates you. Every term we go to the graduate projects of the last class and see everything they have been working on. You see the work that comes before you, and that sets the bar and inspires you. It then becomes your duty to raise that bar and set it for those that come after. It's been a recurring theme here at VFS and it will continue to be.

Street Hockey - Andrea Rosa
VFS's curriculum focuses on the collaborative elements of CG as well as the technical

Tortiglioni - Cindy Jang
Some of the work produced by students at VFS is easily of a professional production standard

studio, with their desks together in one area. We find these bonds have enabled incredible collaborations."

Parker Davidson is currently in his third term at VFS and has streamed into modelling. "At the moment we are tackling some ZBrush for character and environment sculpting to use in our demo reel production pipeline," he says. "It's hard to choose just one facet of the program, but I think designing and working in pre-production on my demo reel has been the highlight for me. You have so much creative freedom and get to work side by side with the instructors. They are always there ready to help, give feedback, or share some tips and tricks. It's great seeing them get excited about what you're creating. There's something very rewarding about seeing your vision starting to take form and come to life."

Gearing for careers

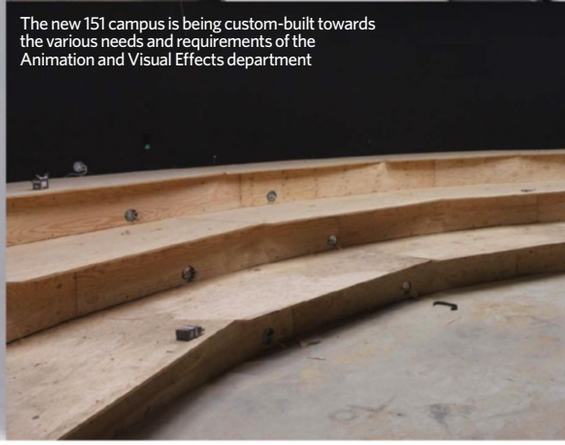
Everything VFS students do is developed with one eye on their move into the job market, with the process of collaboration being more than just a way to create a great reel. "Their first job interview really starts with one another," says O'Reilly. "Dependability and reliability are key."

Of course, networking and collaboration is not just something that happens between the VFS students. The instructors – many of whom still work in the industry as well as teaching – are involved too. Kwan has been working at VFS in various part-time roles since 1995. "I've been bouncing back and forth between production projects and teaching," he tells us. "I returned in 2010 as a full-time instructor with the intent to focus the next part of my career on education."

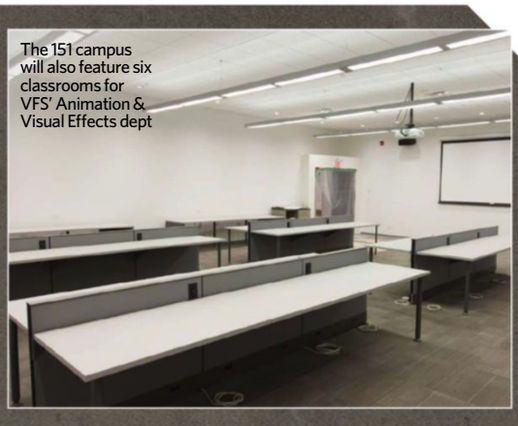
Like the lecturers, students come from all locations and stages of education. Maia Neubig (**www.maianeubig.com**) is now a character TD on *Frozen* at Walt Disney

Vancouver vision

The new 151 campus is being custom-built towards the various needs and requirements of the Animation and Visual Effects department



> Vancouver is a wonderful place to live... The mountains are the best part. Seeing them on the way to school in the morning is enough to remind me where I am and why
>
> **Parker Davidson, student**



The 151 campus will also feature six classrooms for VFS' Animation & Visual Effects dept

A HOME OF ITS OWN

The 151 Campus is a new 106,000-square-foot facility, with 42,000 square feet dedicated to the Animation & Visual Effects department. The site used to be a museum and VFS has spent $4.5 million and two years transforming it into a purpose-built space. It includes a 1,600-square-foot 280-degree greenscreen studio, a life-drawing room and two surround-sound theatres.

"We're really excited about our upcoming move to a brand-new campus that is being built specifically for our programs," says Marianne O'Reilly. "The new facility is also closer to the rest of the VFS campuses and as our students love to collaborate with programs such as Film Production, Sound Design for Visual Media, and Acting, we plan to take full advantage of our new proximity."

Animation Studios and she had a BA in Art from San Diego State University before arriving at VFS. "I first heard about VFS while I was still in high school actually," she begins. "One of my friends considered going there right out of high school and had told me all about it. He didn't end up going, but I kept it on my radar throughout my studies, periodically checking the graduate reels and researching the programs they offered. I did look into other schools, but I ultimately chose VFS because I was most impressed by the reels their students were producing. I liked the idea of only having to do one more year of school, as opposed to three or four more years."

Neubig believes the programs do "a good job of educating VFS students about all the different aspects of job-hunting – from resumes, to interviews, to networking". O'Reilly adds that as well as providing classes in Career Preparation, VFS brings in as many recruiters and guest speaks as it can, listing companies such as Sony Pictures Animation, Imageworks, Pixar, Zoic Studios, Disney Animation, Electronic Arts and Weta Digital. "As they get more familiar and comfortable with the calibre of our students and graduates, we find they come to us early on when they have roles to fill."

Neubig got her first position at Digital Domain by applying through the website. "I was so thankful that I was able to find a job not too long after graduation," she says. The role was a rigging internship, but, as she explains: "I actually didn't do any rigging at first. Instead I ended up helping out with cloth setup and simulation on *Jack the Giant Slayer*. I had never done cloth before this job, but all of the self-direction and self-teaching I had done at VFS definitely helped me, as I struggled through figuring out a brand-new skill on the job."

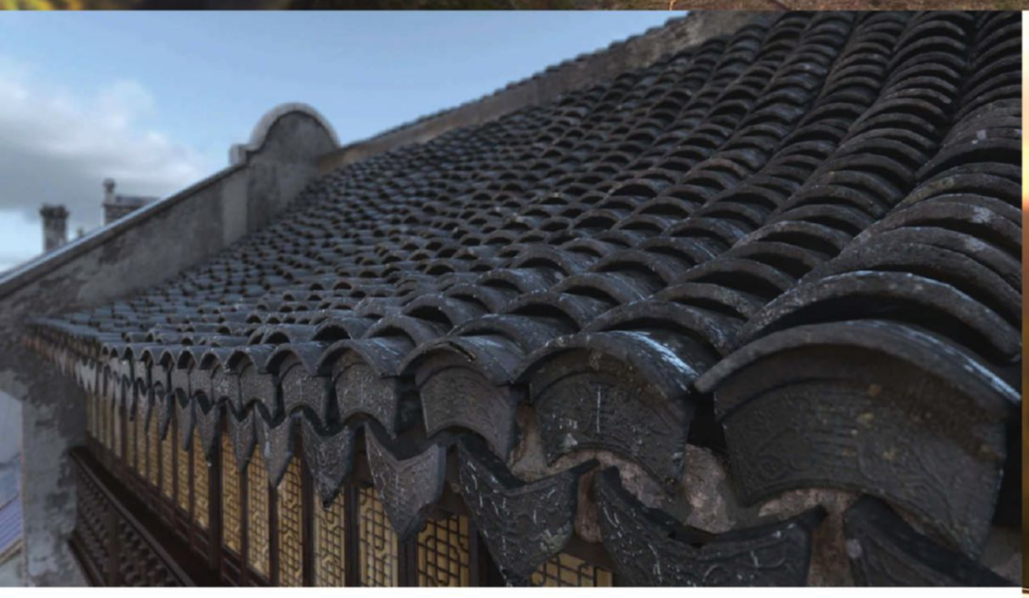
Davidson, meanwhile, is hoping to get into game cinematics: "I have always been in love with the pure gold that the Digic, Blur, and Blizzard cinematic teams put out. It's been a constant source of inspiration and motivation. VFS prepares you to work in environments like these by placing you in a large studio with all of your fellow students. You have work to deliver, due dates and crunches. There are numerous goals to meet and regular meetings with your lead instructors that go over what you've done, what you are doing and how well you are doing it. It's just like working in the industry, which is a wonderful experience."

The Vancouver vibe

The location of the Vancouver Film School is, of course, critical to its success. Being part of such a vibrant filmmaking community means that turning pro feels achievable, with students taking baby steps into the industry while continuing with their studies. Also, to put it rather bluntly, Vancouver is just an awesome place to live.

"I think the multicultural and artistic environment of Vancouver accommodates a truly soft place to land," O'Reilly suggests. "It's conducive to supporting students' experiences." Neubig certainly remembers her time as a student in Vancouver fondly: "The best part for me was the people I met. My class was comprised of students from all over the world and they became like a family to me. I loved getting to know them and working beside them every day. It's amazing how diverse and interesting the

The Frost - Aidin Saedi
VFS mirrors a real world production environment, ensuring its graduates are prepared for their first roles in the industry



Across The Water - Sheryn Lu
Students leave VFS with a stunning showreel aimed at landing them a job

student population at VFS is and you can really form some wonderful friendships along the way. I am still close with quite a few of my classmates."

Davidson, who is currently going through the process of working and bonding with his fellow students, says that learning from his friends can be just as useful as from his tutors. "You have unlimited resources between what is available from your instructors and your fellow students, who will ultimately be the ones you learn the most from," he says. "You learn more from one another and working hard together in the environment VFS provides. Also, Vancouver is a wonderful place to live, if a bit expensive. There is so much to do and see that's only a short walk or bus ride from the school. For me though, coming from a small town, the mountains are the best part. Seeing them on the way to school in the morning is enough to remind me where I am and why. It's a great experience... I'm just trying to find the cheapest places to eat lunch at the moment!"

Of course, Vancouver is not a cheap place to live and Vancouver Film School is not a cheap place to study. Currently a year studying Classical Animation will set you back about £19,200 and 3D Animation & Visual Effects costs £33,500. Of course, not just anyone who can afford the fees can study in Vancouver, either. While it doesn't require specific grades or a university education, the school does have certain entry requirements, including the completion of the VFS Foundation Visual Art & Design program, or a portfolio that spans still life and 3D work. For full details, visit **www.vfs.com**.

Sunset Point - Maia Neubig
Vancouver is a thriving technological hub, making it an ideal location for students to start their careers

Vancouver vision

Macro - Maria Esther Lopez Rodriguez
Thanks to rolling start dates, VFS can quickly and easily update its curriculum

> "The School generates over 900 finished productions each year – that's more than any school in the world"
>
> **Marty Hasselbach, managing director**

Standing out

The somewhat challenging entry requirements notwithstanding, Hasselbach believes that VFS has developed an entirely unique education paradigm. "The School operates very much like a studio production and distribution entity," he explains. "It develops, physically produces and distributes student content in all aspects of entertainment (film, 2D animation, 3D animation, writing, digital design, sound design, videogames and so on). The School generates over 900 finished productions each year – more than any school in the world." It's the fact that students come out with such polished material, as well as the confidence that this gives them, which has enabled them to flow easily into the industry and rise up the ranks.

To get all those students organised and creating those 900 productions a year, VFS relies on its rolling start dates. "Structure and organisation are the overarching forces necessary to effectively accommodate continuous change while providing strong support for creative development," says Hasselbach. "By graduating small classes at two-month intervals, we're able to regularly and holistically assess all curricula for usefulness, performance and relevance."

While a solid curriculum and great organisation form the basis of the education that VFS students are receiving, there does seem to be some fairy dust along the way too, making for an experience that's more than the sum of its parts. Neubig certainly thinks so: "The 3D Animation & Visual Effects program at VFS is very special and produces a unique breed of artist. It's an intense program that really pushes its students in order to make sure they learn as much as possible in that single year of study. It's not for everyone, but if you're truly dedicated, love 3D animation and visual effects and really want to learn, then it will undoubtedly be a great experience. The teachers and advisors are all industry professionals, so they teach practical skills, not just theories and ideas. I think that makes a huge difference in the way they teach and what we, as students, take away from the whole experience."

So, is straightforward hard work the secret behind the success of VFS's graduates? Perhaps it's the exclusive access to creative professionals, the ever updating curriculum, the collaborative approach to education, the award-winning location, plus some good old-fashioned passion and dedication sprinkled on top. "We hear from the industry that VFS graduates stand out because they're production-ready, prepared for long hours and take direction extremely well," concludes O'Reilly. " Our graduates know that it's not about getting the job. It's about keeping the job."

Jennifer Gustafson's short film *Flamingo Love* demonstrates the importance of story – both in making a good film and creating something compelling for your reel

IT'S ALL ABOUT THE STORY

Whether you're working in videogames or film, there's one structural element that remains constant: story. Ensuring that students at Vancouver Film School can speak the language of narrative is paramount to their success.

"I think what makes us unique is that we're a one-year intensive program that prepares students with strong technical skills with an emphasis on story," says Casey Kwan. "It's a pretty lofty goal to achieve in one year, but I think the success of our students over the last decade shows that we're doing something right... It's not just about learning a craft at VFS, but learning how to apply that craft contextually in support of story.

"Other schools shy away from story because it can be a big mess introducing this topic into the curriculum alongside all the technical challenges students face," he continues. "But, the fact is that most directors don't talk technically, but rather in terms of story. Having the language and understanding of story in relation to craft is a critical skill that all artists need to cultivate. Laying that foundation in the School is therefore imperative in my opinion."

• **Lukruk tutorial** see how Benjamin Erdt, graduate of VFS, put his skills to use on **page 46**

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Step by step

Easy-to-follow guides take you from concept to the final render

Artist info

Ben Erdt

3DArtistonline

Username: Benjamin Erdt

Personal portfolio site www.ben-erdt.de

Country Netherlands

Software used Maya, 3ds Max, MODO, ZBrush, MARI, NUKE, Photoshop

Expertise Concepting and producing both hard-surface and organic models

Armoured sci-fi characters

Lukruk – The Thelarian Elite 2012

"Here I'll discuss how I created a highly complex and functional armoured alien character, from concept through to final vision"

Ben Erdt is a professional artist currently living in Amsterdam and working at Guerrilla Games

***Lukruk* is an armoured alien character I created as an exercise at Vancouver Film School.** During this process you'll get an insider's view of his creation from the first spark of inspiration to the final render. By the end of the steps you'll have a full understanding of how Maya, MODO, ZBrush, MARI, Photoshop and NUKE can be used to achieve the final result.

Lukruk was a very complex project from both a design and technical point of view, so here you can get a closer look at how to design and build complex characters with rigging and animation in mind, without compromising the original design intent. I'll also share my approach for keeping clean topology for efficient subdivision, rigging, texturing and rendering.

This project was a great learning experience for me in fields such as design, modelling, texturing, rigging, animation, rendering and VFX, as well as how to collaborate with other disciplines. I hope the little nuggets of experience shared here will help and inspire you with your own characters.

Make a concept

Develop who and what your character is

01 Turn inspiration into a concept I imagined a futuristic knight standing on a high platform. Since he's extra-terrestrial, I wondered what if an alien race – after their first contact with mankind – became inspired by human history, especially by the stories about the Knights Templar and the samurai. If they used their superior technology and created their own group of protectors, what would a member of this group look like? I imagined them as characters who are spiritual, intelligent and serene – like a group of contemplative listeners – but also as powerful and unpredictable creatures. They have a monastic lifestyle defined by traditions and strict rules. Only their strongest hatchlings are selected and *Lukruk* was one of the chosen.

01

02

03

02 Take the design in-depth As the head is the focal point of the character, I wanted to make sure *Lukruk* had a very expressive face, attitude and a great design. I wasn't happy about the first iteration, because he didn't look as powerful as I wanted. I decided to make his head more angled and sharp along the jaw. The argus monitor lizard was a great reference for this. The elongated cartilage tips on *Lukruk*'s chin further helped to emphasise the shape of the head. To counter the aggressive features of his design a little, as well as to add some conflict to the design, I gave him two small ears.

03 Imagine the body and armour *Lukruk*'s armour was designed to be functional and built for protection, but it's also supposed to have a bit of an elegant and ceremonial touch that comes through the curved lines and shapes. Because I imagined the model having lots of detail, I figured a more humanoid silhouette would be better to read. When putting on the armour, the longer tail was supposed to be a mechanical extension that could be used as a weapon. As a reference for his default facial expression and attitude, I referred to heads of birds of prey such as eagles, hawks and falcons. For the hard-surface parts of the armour I specifically collected images of sports motorcycles, CNC machine parts and landing gear. These were incredibly useful reference points when approaching design as functionality.

Find energy and flow

A friend of mine advised that when turning a person into a stylised cartoon character or caricature, he focuses on capturing the energy, rather than the actual shapes. By this he meant the mental side, such as the essence of the person, as well as the character's personality and story.

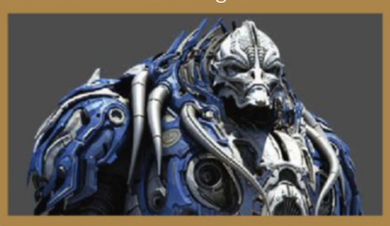
From the start I was sure about the energy I wanted this character to have. The rather wavy movement of lizards and the elegant motion of snakes can be used to describe the feeling of the form and lines *Lukruk*'s body is supposed to have.

Learn how to

- ☑ Prepare a character concept
- ☑ Model the character's head
- ☑ Block out the body
- ☑ Maintain clean topology
- ☑ Sculpt skin details in ZBrush
- ☑ Unwrap in MODO
- ☑ Prepare a complex model and scene for rigging, texturing and animation
- ☑ Bake Cavity maps in MODO
- ☑ Keep colour tones consistent across multiple files
- ☑ Create a colour concept for texturing a head
- ☑ Design for functionality

Concept

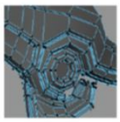
Inspired by the unpredictable-looking reptiles such as tegus and iguanas, the spiritual feel of Gregorian chant, the armour of the samurai, as well as the Knights Templar, I decided to create *Lukruk*, an armoured alien lizard knight.



With the Disc

Tutorial files:

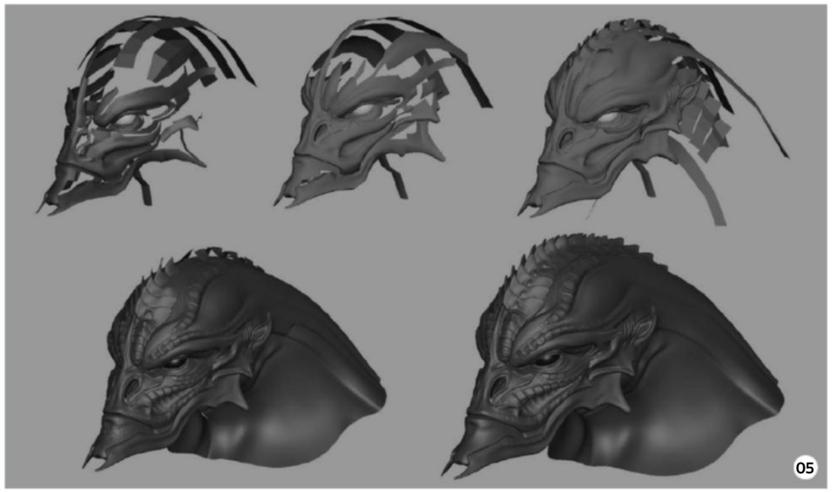
- Video tutorial of baking Cavity maps in MODO
- Video tutorial showing tips for symmetrical modelling in Maya
- Video tutorial on rigging by Amir Ronen

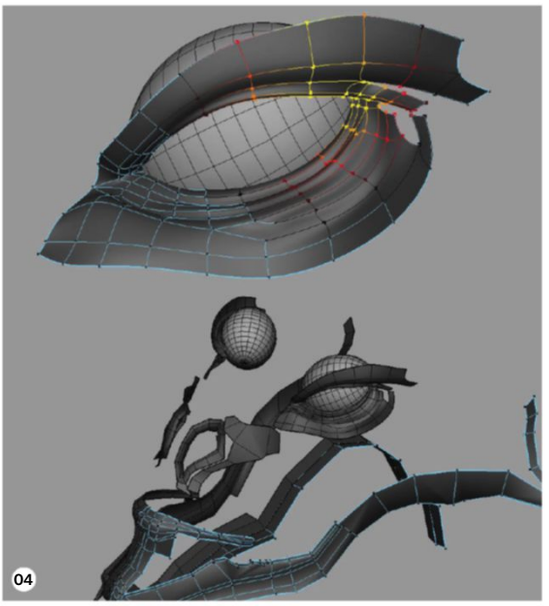


Work on the model

Begin sculpting in Maya

04 Work on the head Starting out in Maya, I always begin modelling the head because it's the most important part of the figure and can determine the look and feel of the character. For example, a bulky head with a fat neck would make me expect an appropriate body to support it. I start with the eyes first, placing a polySphere at the position where the eyeball sits and scaling it to fit. For shaping the eye socket, I usually start with a single polygon and work my way around the eyeball. When beginning work on a model, start simple, as too many polygons can make any fixes later on rather difficult and time-consuming.

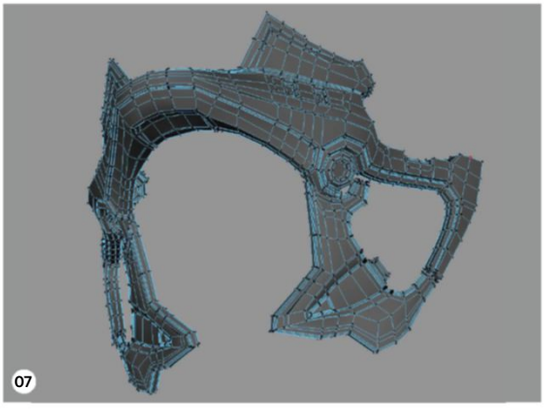


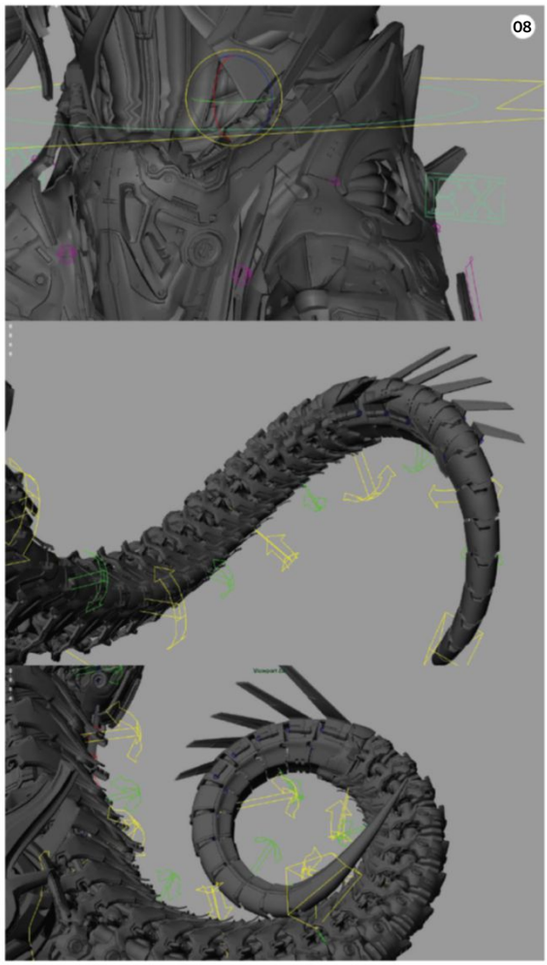


05 Refine the head After blocking in the eyes, I move over to the mouth, ears, lips, the jaw and the bony structures around the head. The goal is to create the individual facial features first and stitch them together at the end. When they are separate, it's easier to move them around and adjust the head proportions. With the eyes filling the spaces in between, you can already see what the proportions and volumes are going to be. Above Lukruk's eyes I created a row of eyebrow-like scales, which help when conveying emotion.

06 Model the body When modelling the body I followed the same approach as for the head. I started modelling, then tweaking very rough representations of the features to build the correct silhouette, shape and volume. In order to manage the amount of detail in the original concept art, I broke it down to primary, secondary and tertiary shapes using colour coding. During the modelling process, I needed to determine the large and small shapes, as well as where they join or overlap one another without constantly referring back the original concept work. The chest was one of the more complex pieces, so I wanted it to fit as neatly as possible. Since everything else was proportionally correct at the end, the chest was very easy to add in.

07 Efficient topology To avoid inefficient geometry, the topology was created to look nice and smooth, with a maximum of two subdivisions, though most of the pieces needed only one. The overall rule was to have complex forms and shapes with a decent amount of polygons for each object. In effect this made life a lot easier for later unwrapping and texturing all the pieces. Always try to stay as clean and efficient as you can and it'll pay off later on.





A clear end goal

I believe it's important to know the end purpose of your creation. In this case the character was a production model for a short movie. At the end we were going to need many high-res textures, as well as a complex mesh with lots of individual pieces that were going to be rigged and animated, but we also wanted to keep the render times as short as possible. I thought about what could be done in advance in order to stay efficient without compromising quality. For example, adding simple colour shaders while modelling can help to get a better overview of the shapes and details. It's also good to sometimes step back and see if the model still fits the concept art and has the same energy.

08 The model versus the rig Making sure that *Lukruk* wasn't only functional in design but also in terms of articulation was a challenge, so I gave extra focus to areas that were most visible and complex. One of the more complicated parts was the waist, as the tail, shield flaps and legs all come together in this region. To avoid individual armour parts touching or interpenetrating one another, I used a basic proxy rig while modelling to ensure any changes made improved deformation as well as design. Instancing geo here also served to improve iteration times. To make the tail believable and to maximise the range of movement, its inner core was based on a row of single vertebrae inspired by the chameleon – one of the few lizards that can completely roll their tails. This dynamic tail is key to Lukruk's personality and body language.

09 Sculpt skin details ZBrush was used for detailing the head. As for reference, I chose images of crocodile skin to create a smooth transition between the separate scales and skin. Greek turtles have a noisy scale pattern on their neck that I used for inspiration when sculpting the softer skin parts on the character's face. I used the Clay brush to block out scales, then while sculpting in the surface details I kept the design of his head in mind, making sure the details didn't overwhelm the overall aesthetic. The Slash2 brush was used to sculpt in some overlapping scales, while the Slash3 and Dam Standard helped to emphasise the crevices in between. The Inflat and Standard brushes add more volume to the fleshier areas, while hPolish was used to break some of the hard edges of the scales. Once happy with the result, I rendered the Displacement map inside ZBrush. Here I chose an 8,000 pixel-sized map to have an opportunity for a higher-res detail pass in MARI.

10 Develop the tones Before jumping into MARI I wanted to make a colour concept for the head to get a better idea of the possibilities therein. I rendered out basic passes – AO, Depth, Shadow and two Light passes – using the BPR Render in ZBrush, just as a base to paint on in Photoshop. Once they were composited I started to build up the skin, while each group and layer represented a paint step for the skin. As a result I had a clean layer structure that was going to be rebuilt in MARI to achieve the textured look.

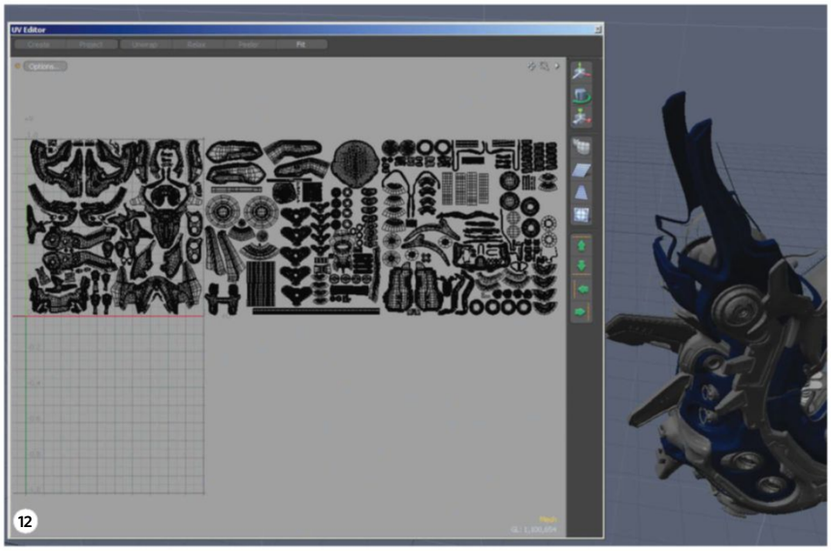
Clean up the scene

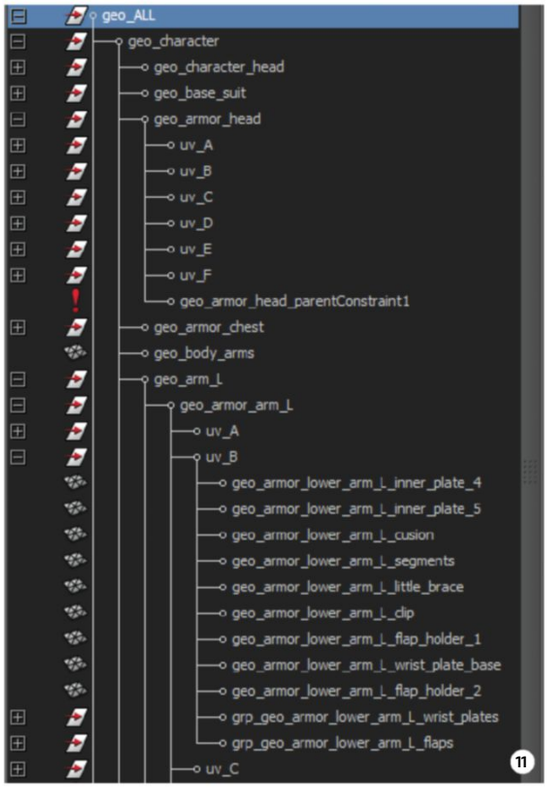
Prepare and unwrap the geometry for the next stages

Complexity demands organisation

Lukruk has an extremely complex hierarchy. Counting meshes alone, around 1,800 different objects needed to be named, grouped, organised, unwrapped and laid out efficiently in UV space. A clean scene is vital to making your life and those of your colleagues easier. Clean UVs within a good layout are half the texture job and even riggers can benefit. I decided to unwrap everything in MODO because I was going to bake Cavity, Flat, Diffuse and RGB maps in it. Switching applications also brought a bit of variation into this tedious process as I like using a Cintiq when working inside MODO. When it comes to polygon-modelling, especially, this is one of the most artistic methods I have found.

11 Sort and name the pieces In order keep the amount of potential issues low later on, it's important to keep a clean scene. I went through the scene hierarchy and deleted nodes such as empty groups, duplicates, unused nodes and so on, to make sure there was no excess left that could cause problems at a later stage. All geo objects were sorted according to the design hierarchy of the character. For example, everything in the left arm was contained in a Group node. Individual objects were then grouped separately according to their visibility, size and shape hierarchy. Each group represented one quadrant in UV space, which was the foundation for the UV-layout and texturing process.





12 Unwrap all the pieces I exported the pieces as individual OBJ files for UV-generation, plus the MTL file to keep the assigned colour shaders inside MODO for later texture-baking. The tools I predominantly used were UV Unwrap, Relax UV and UV Peeler. Unwrap and Relax are helpful for generating and refining UVs of shapes that are more organic and curved. The UV Peeler is a fast tool to unwrap pipes and hoses. For simpler shapes that are more cubic, spherical or cylindrical, I used the UV Projection tool as a starting point, as it offers appropriate projection types. The screenshot shows the finished UVs for a part of the foot.

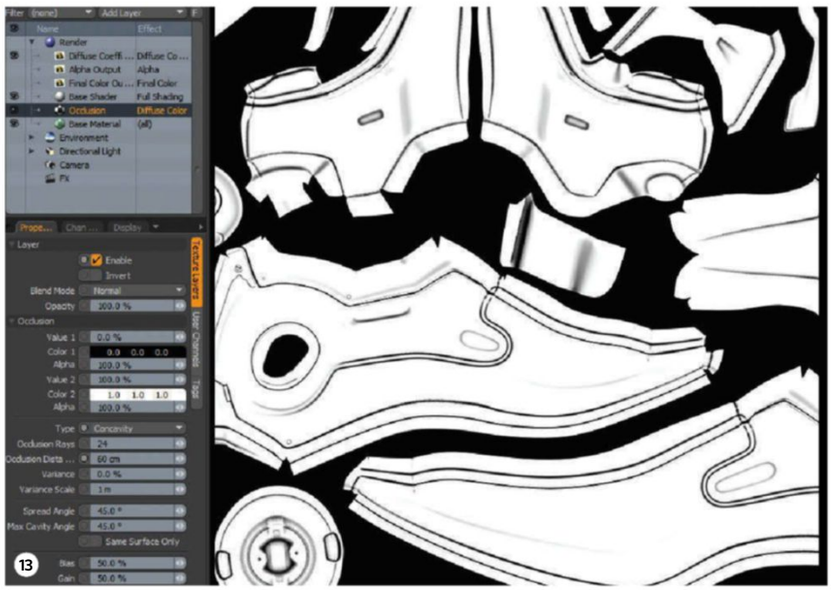
Collaboration is key

This project was a shared effort between several people, with Amir Ronen performing rigging and secondary animation, Colin Giles completing primary animation and myself responsible for design, modelling and texturing. We shared and referenced the main rig as a master file that was frequently updated with rigging information by Amir. When Colin, the animator, started blocking out the animation, I could work on the textures and shaders. In order to stay on course, we had regular meetings to discuss our progress, the next steps in the work, and to discuss any current issues that might have arisen.

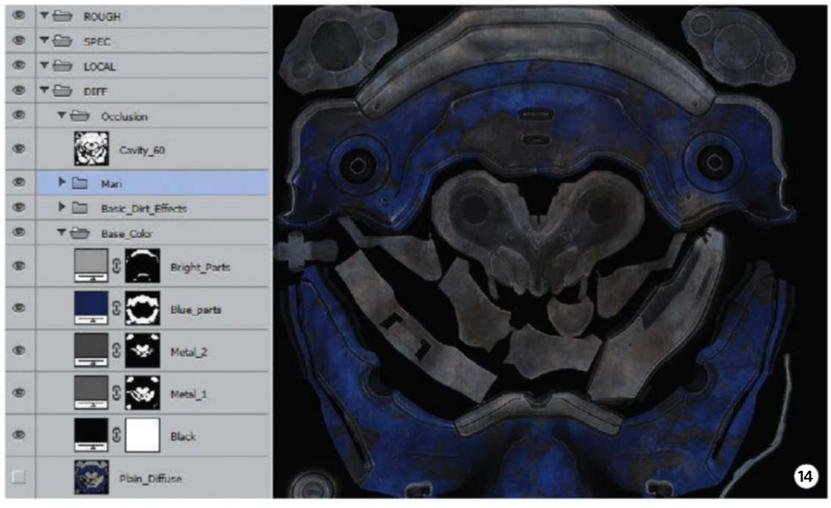
Supplied with this issue you'll find several video tutorials from Amir (**www.amirronen.com**). Who generously provides an in-depth look at his rigging workflow.

Prepare textures

Enhance and refine the character



13 Cavity/Convexity maps in MODO Since I was going to texture the actual high-res character mesh, I used Cavity maps as a guide for painting textures. These were baked inside MODO using the Occlusion shader. They also helped to bring back some detail into the Diffuse texture. In MODO I added the Occlusion shader to the Shader Tree and set it to Concavity with a Max Distance of 60cm and a Spread Angle of 45 degrees. I created another Render Output, set it to Diffuse Coefficient and made sure the Diffuse Amount inside the base material was at 100%. The desired texture resolution for the particular object was set inside the MODO Render Properties. Remember, baking these maps in MODO using the Occlusion shader takes some time. With this issue you'll find a step-by-step video guide for baking Cavity maps.



14 Begin authoring textures After unwrapping the entire character model, I ended up with almost 50 sets of four to five textures, so it was important to maintain a consistent workflow. The hidden Plain Diffuse layer was used as a selection guide. The Dirt Effects group slightly broke up the flat colour among all the textures and added overall dirt and grime to the character. The MARI group consisted of object-specific layers that were painted in MARI 1.4, although this workflow was improved thanks to MARI 2's full PSD support. Additionally, to make the final character design easier to read, I made his feet more muddy, while reducing this effect higher up his body. This resulted in a light colour gradient from bottom to top. I also focused more on areas that look worn-out and used in order to add a bit more history to his armour.

Artist Showcase

Ben Erdt

I'm a professional character artist working at Guerrilla Games on next-gen game characters. I've been fascinated by sci-fi universes and movie creatures since I was a kid. I trained myself in CG art so that I could make my own.

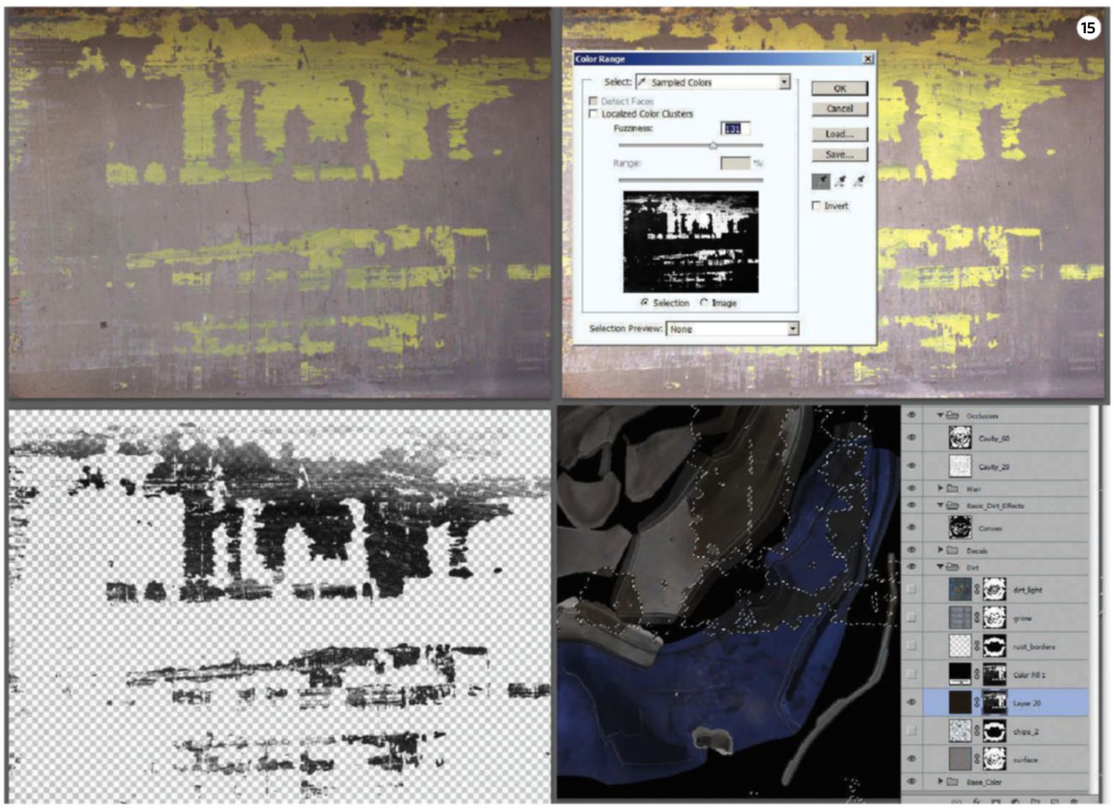
Batty **ZBrush, Photoshop (2013)**
This is the kind of sculpt I do after work or over the weekend. In this case I wanted to sculpt a bat-like creature based on a drawing I did some time ago

Collector **3ds Max, ZBrush, MODO, Photoshop (2011)**
One of the game characters I created for practise. I blocked out the body in ZBrush, modelled armour in 3ds Max, rigged in Maya and textured in Photoshop

Deep Sea Creature **XSI, ZBrush, MARI, MODO, Photoshop (2012/2013)**
I wanted to texture the deep-sea creature model that appears in my demo reel. It was modelled in XSI, sculpted in ZBrush, textured in MARI and then unwrapped and rendered in MODO

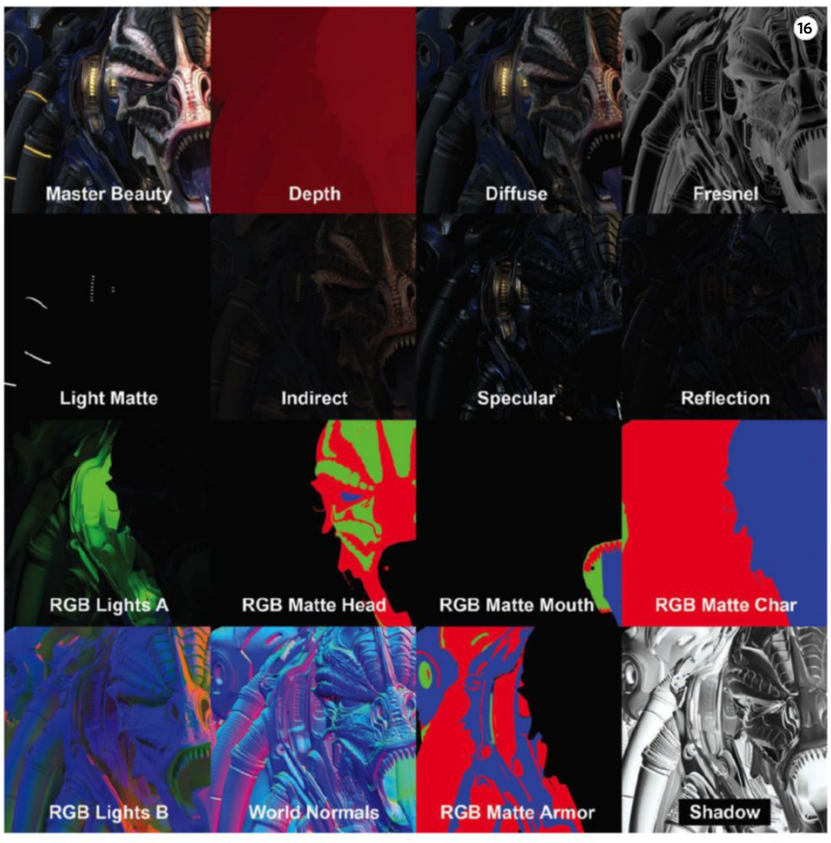
Render and post-production

Finish with tiny details and complete render passes



15 Include dirt and paint chips

Alongside some hand-painting, I also used photomanipulation for texturing Lukruk – something that increased his sense of believability. A great source for photo textures is **www.cgtextures.com**. In order to add paint chips to the character, I chose a texture with a high contrast between the paint and the areas where it had faded. I created a selection using Color Range and used it as a mask on a solid colour layer. This enabled more control if I needed to change the hue, saturation or brightness. Back in MODO I then baked an additional Cavity map with a lower range, as well as a Convexity map that was used to emphasise the edges in the roughness texture.

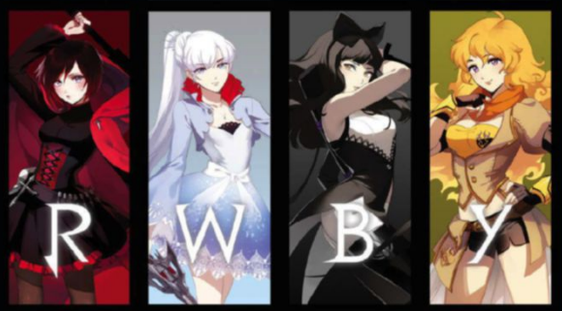


16 Render out passes The screenshot shows the passes that an average shot required. My friend and colleague Andrew Paxson (**www.andrewpaxson.com**) was in charge of compositing and adding VFX inside NUKE and he did an amazing job. I wanted to give Andrew as much control as possible over the shots, so to give us the opportunity to tweak the blue parts of the body armour, I took the flat colour textures that I baked before texturing and created simple RGB maps. The result was a pass in which R represented the metal types, G represented pieces that could cause potential artefacts and noise, while B represented all the blue parts of the armour. Staying clean and organised like this from the very beginning saved us a lot of time during lighting, rendering and composition. There was one case during the first render test in which I had a bad polygon causing the Subdivision Approximation to crash mental ray. However, because the character model had an elegantly structured hierarchy, the bad piece could be tracked down and quickly fixed.

Final words

Building a complex character such as *Lukruk* can seem intimidating, but when you break it down and organise it into many simple tasks it will feel much more achievable. Be careful to never lose sight of the original design intent, no matter how challenging the task is. For instance, I could only texture *Lukruk* by splitting him into 50 textures, but I still made sure that all of those textures were consistent and re-enforced the original design concept.

• **DID YOU KNOW?** • All tutorial files can also be downloaded from: **www.3dartistonline.com/files**



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Step by step

Easy-to-follow guides take you from concept to the final render

Make photoreal hair

Twisted Sensation 2013

Artist info

Yasin Hasanian

Personal portfolio site www.superhero.cgsociety.org

Location Iran

Software used Maya, ZBrush, Shave and a Haircut, mental ray, Arnold, NUKE, Photoshop

Expertise Yasin specialises in texturing, shading, lighting, modelling and sculpting

With the Disc

Tutorial files:

- Tutorial screenshots with all Yasin's settings

> Creating CG hair has always been a challenge, but here you can learn a straightforward workflow for photoreal results

Yasin Hasanian is a freelance CG artist. He has been working professionally in the film and game industries for over five years

If you've ever wanted to produce photorealistic hair in weird and fantastical styles, look no further. Hair becomes more complex as it gets longer and there's no absolute way of tackling all the different variations. For instance, short hair may incorporate a different approach to long locks. This means your workflow will have to change in different scenes under certain conditions and your techniques must evolve to keep up. There are numerous software and plug-ins out there that are specifically tailored to deal with hair, such as Shave and a Haircut, YETI, Ornatrix, Hair Farm and so on. Each of these has its own pros and cons, but what's common in all of them is that they offer you most of the primary settings and sliders you need to achieve something desirable. Here we'll use Shave and a Haircut for the hair, Maya for setting up the scene, ZBrush for sculpting and FiberMesh-generation, Photoshop for texturing, mental ray and Arnold for rendering, and NUKE for compositing.

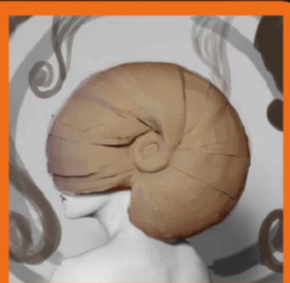
Regardless of the tools used, most of the techniques discussed here can be applied to other packages, since the principles are the same. We will also be looking at how to troubleshoot certain issues that can crop up along the way.

Learn how to

- Use different strategies for creating and styling long hair
- Optimise hair parameters for render efficiency
- Approach texturing using a range of different methods
- Work with the hair shaders
- Light hair with style
- Unify scene settings to work best with realistic hair
- Composite your final image

Concept

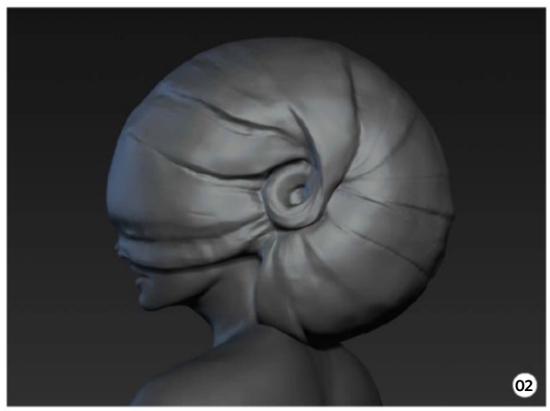
This image is inspired by the works of the amazing hairstylist, Linh Nguyen. I highly suggest that you take a look at his portfolio for some great inspiration and fresh ideas for hairstlyes.



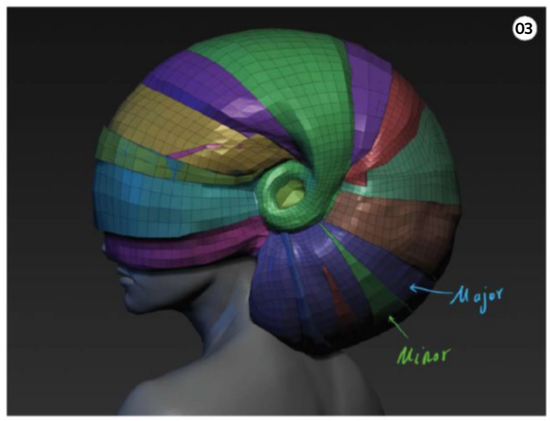
Analyse your concept

Plan your workflow carefully

01 Design a hair style Consider what kind of hair you want to make. Is the hair intended to be short or long? Is it curly or wispy? How visible are the hair clumps? How should it look, dry or wet? These are some of the questions that should be answered first in order to perceive how they relate to one another. Essentially this avoids any headaches later on. For example, suppose you generate some hair and want it to look wet, so you'd increase the specularity and glossiness. However, what you get in the render may look nothing like a wet hair, as wet hairs clump to one another too. Getting these details right is key for a successful render.



02 Begin modelling and sculpting
First send a basic model of your subject to ZBrush to be sculpted and posed. Using a sphere with DynaMesh, start sculpting a rough shape for how you'd like the hair to appear. While blocking this out, make sure your material has a nice specular disposition, something that can resemble a hair material according to your concept. This way you can develop better ideas for where you want to put your lights and how your hair will react.



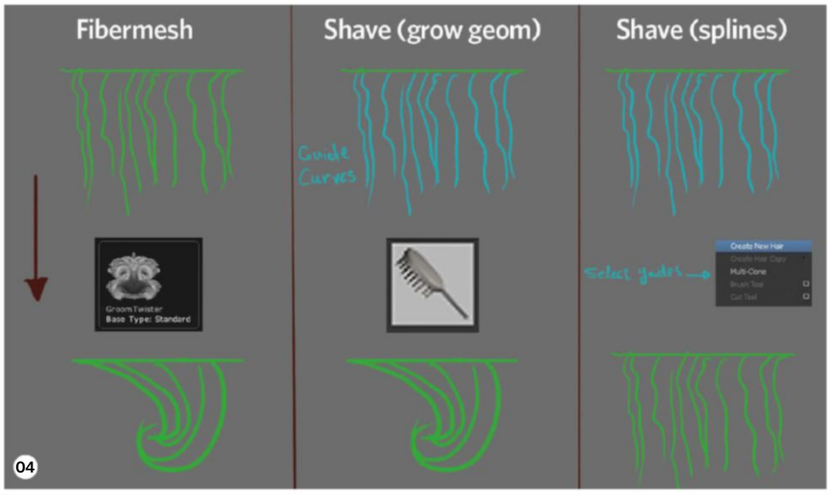
03 Identify hair forms There is no way you can achieve a complex hair shape in a single run unless you love software crashes and nerve-wracking slowdowns. This means you'll need to divide the hair shape into smaller sections according to the concept. Append a ZSphere and retopologise the high-res mesh into a low-res one. Keep in mind that the flow of the retopologised mesh is very important, as we are going to extract Guide curves out of them later. Next, using PolyGroups, you can go over the mesh and specify regions of the hair that have to be split into smaller sections, with regards to their shape.

Divide and Conquer

In computer science there is an algorithm called Divide and Conquer, which is used in most fields. It simply suggests that if you are facing a big problem, you should break it into smaller pieces, solve those problems and add them all together. Being able to dissect something into its essential elements is a huge plus in such cases. In this particular instance, the hair is made from different sections and in each of these sections there can be any number of hair types, colours, lengths and so on.

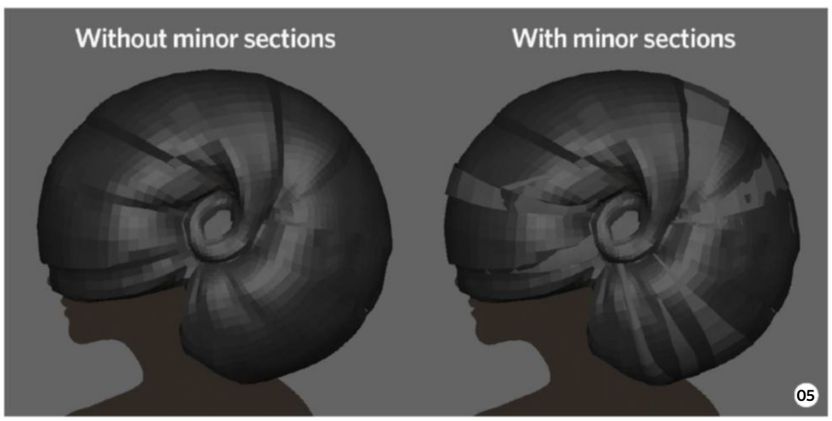
Generate the hair

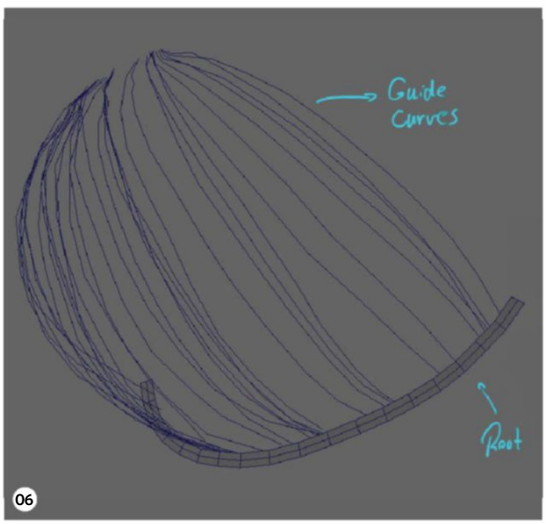
Set up the scene in Maya and adjust the hair parameters



04 Approaches to creating hair There are a range of ways you can generate CG hair. A popular approach these days is using FiberMesh in ZBrush, which works great most of the time, but the only downside is its lack of precise directability. Also you'll sometimes need to enable Solo mode when styling a hair, otherwise you may get unwanted results. However, the Shave and a Haircut plug-in itself offers two useful methods. You can form a geometry and additionally comb the hairs using Comb brushes or Guide curves, or select a bunch of Spline curves and generate the hair out of those.

05 Set up the scene Bring the low-res mesh, which was broken into sections previously, into Maya. Here we only have around ten major sections, but that's not enough to offer a result that feels real. When you look at hair you can see there are actually several layers covering one another, from below and top. This means you should increase the amount of sections substantially and then rename these accordingly. These sections basically give more variety to the major sections by crossing over and into them.





06 Adjust Shave and a Haircut Once you have all the sections ready, they can serve as useful guidelines as you continue. Based on the complexity, different numbers of curves can be extracted from both the major and minor sections to use as guides. Now model a very basic root for each section in order to grow the hair, then later groom the hairs that grow out of the roots using extracted curves. To avoid any unwanted behaviour from the generated hair, make sure all the extra details are initially set to 0, such as Rand Scale, Frizz, Kink and so on, then slowly build up the overall look.

Artist Showcase

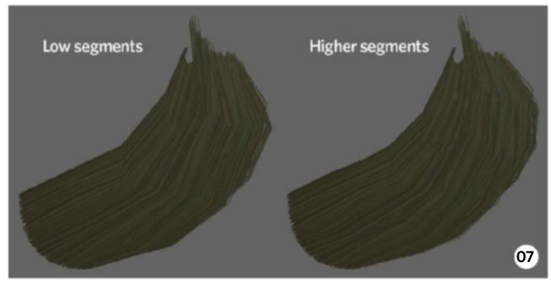
Yasin Hasanian

Yasin was born in Iran in 1990. He has had a great passion for both the art and science behind CG since he was 14 years old. He holds a bachelor's degree in Computer Science and has been working as a freelance CG artist in the industry for over five years. Yasin has created work for many major clients, but he still wishes to one day land a job at a major studio.

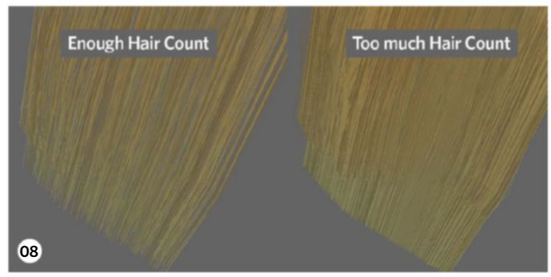
Aroma **Maya, ZBrush, Bodypaint, Photoshop, mental ray (2012)**
I decided to do something fresh and tasty, and this was the result!

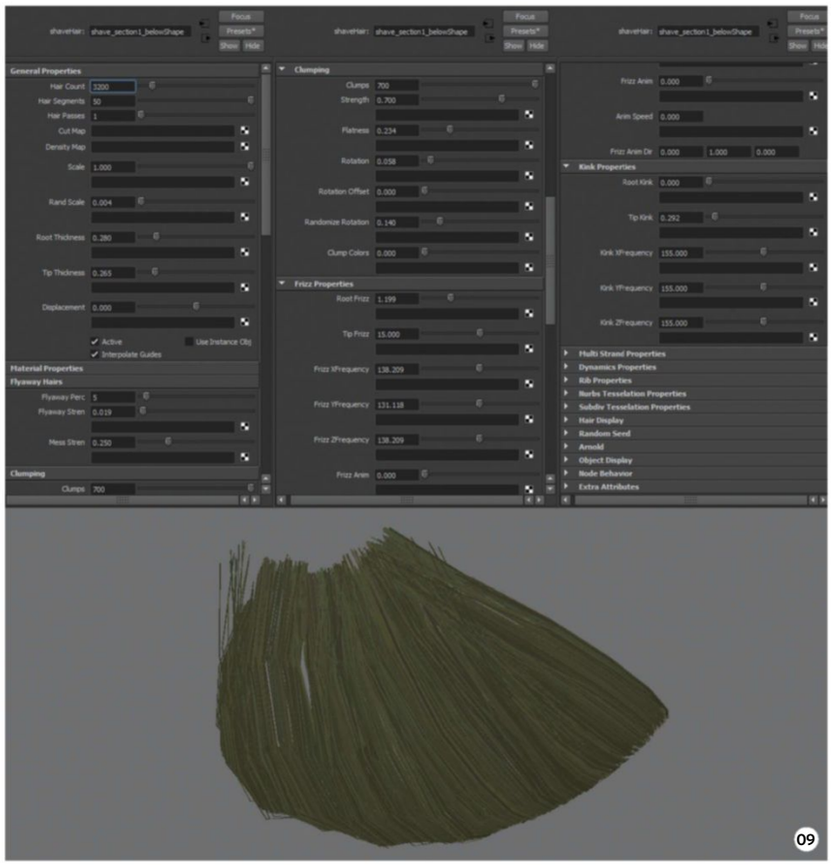
A Day Out **ZBrush, Photoshop (2011)**
When creating this image I was feeling nostalgic for how I used to paint when I was a kid, so I thought it would be nice to digitise those memories

07 Tweak the settings for longer hair The very first attribute that should be tweaked for long hair is the number of segments. This should be high enough to address any kind of hair strand rotation or curl, without going jagged in the render. Unfortunately one caveat in Shave and a Haircut is that it's not possible to view a Shave node with the full number of segments in the viewport, as it's hard-coded. This means you'll need to be constantly checking out your renders. Set all the Hair passes on the Shave nodes to 1 as well, to avoid any speculation. Hair passes are often useful for producing fluffier variations of hair.

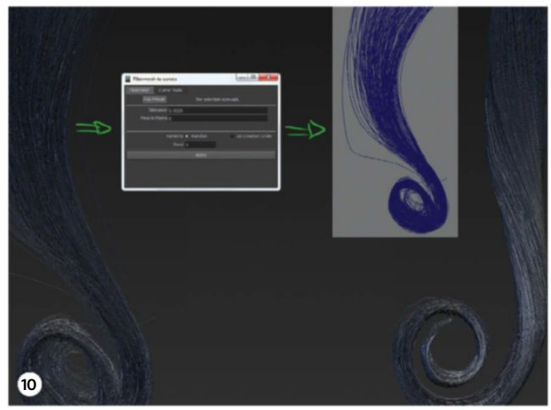


08 Set the Hair Count Now you need to determine what Hair Count to set on the Shave node. Bear in mind that not everything in CG can be treated in a physical and logical manner. Supposedly, the average number of hairs on your actual head is around 140,000, but simply inputting this number as the Hair Count isn't wise at all. In most cases you can get away with a far smaller number of hairs, which is why there's a Root and Tip Thickness setting, even though this has to be adjusted based on camera distance or for other purposes. A higher Hair Count may be needed if you plan to use hairs with less thickness and view it up close.





09 Produce variation So far the general form of the hair is laid down by covering different minor and major sections with hairs. However, it's subtle details, such as clumping, kink, frizz and of course adding flyaway strands, that make the hair interesting. Remember that adding strong flyaway hairs in long hair can introduce unwanted results. A decent amount of Mess Stren brings some nice imperfection to the hair. Another way of adding bolder variation is by selecting the Shave node, going into Component mode and selecting only certain guides that need to be tweaked further.



HaloMare **ZBrush, Photoshop (2011)**
This was made for the first ZBrushCentral Halloween challenge

10 Dangle some hair clumps You can re-create dangling hairs using FiberMesh in ZBrush, where the possibilities are endless. A GroomHairLong brush is great to establish the initial look of hairs. Then, using the GroomTwister and Move brushes, you can achieve the curly shape you see here. But how to send FiberMesh to Maya? FiberMesh itself only exports curves when it's not Accepted yet, and exporting the FiberMesh mesh is unwise because of the high poly count and the fact that hair shaders will have no idea where the root or tip is. This could result in an incorrect output. Nonetheless, some nifty scripts are available to convert FiberMesh to curves, such as the one found here: **tinyurl.com/3DAHairRenderTut**.

Be careful with complexity

While creating guides or combing the hair, don't expect Shave and a Haircut to exactly follow long and complex guides. The more twisted and longer the guides get, the higher probability of Shave going strange in the render. Moreover, sometimes tweaking complex hair guides after the Shave node is created will instantly destroy the shape of the hair. Also, keep in mind that for further control on your hair shape the root geometry should have a decent amount of vertices, because the Shave guides grow out of those. You need to plan ahead.

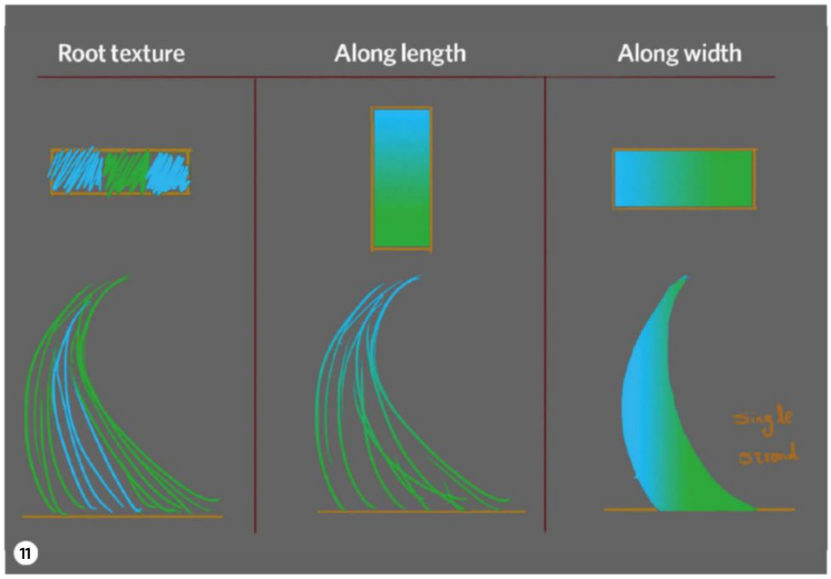
Texture and shade the hair

Continue working on the model and bring out the realism

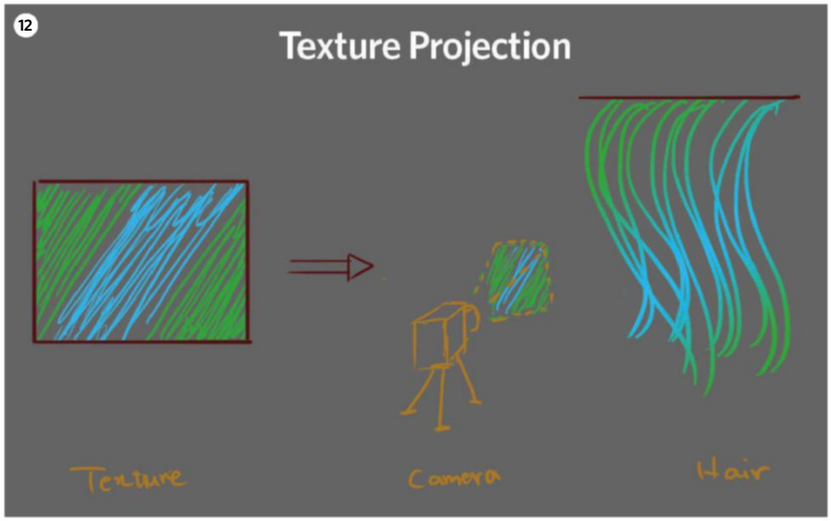
Build a precise shader

Inspecting different shader components plays a key role in achieving photoreal hair. Usually accomplishing this task gets harder as the hair becomes more colourful, especially when it gets longer. Usually blonde hairs have the most colour variation in them. To master this ability, looking at as many references as possible and then trying to figure out, for instance, why area A is yellow, helps a lot.

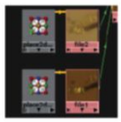
11 Test some texturing methods There are a few ways hair can be textured, by utilising either root geometry UV cords, hair strand UV cords along the length and width, or projection that includes 3D textures. Combinations of these methods are also possible. In the first method, a texture is painted according to the root geometry UV space, then the hair will pick up the tones on the texture and propagate it to the whole hair. In the second and third methods, textures are painted to address the colour desired along or at the width of the hair strands.



12 Texture according to the camera In another texturing method, a texture is painted based on a certain view from the camera, or any other projection types, then that texture gets projected on the hair. This can be very useful for long static hairs, whose colour changes frequently along the length and/or width. This is because it eases the process of texture-creation and shader set-up. While painting such textures, your brushstrokes should respect the hair flow, otherwise it will look somewhat fake.

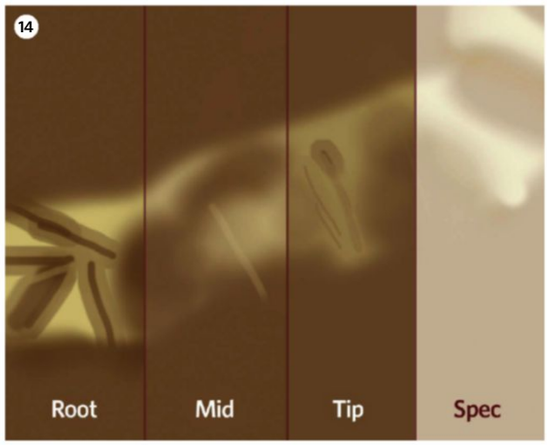


13 Begin shading Many hair-shading models have been recently introduced, such as Kajiya-Kay and Dual Scattering, which give a physically plausible behaviour in the render. Hair is mainly comprised of three shading components: Diffuse, Specular/Reflection and Translucency/Scattering. Translucency is most visible when the hair is backlit. Most render engines have specific hair shaders and each of them offers you enough control to get a decent look.

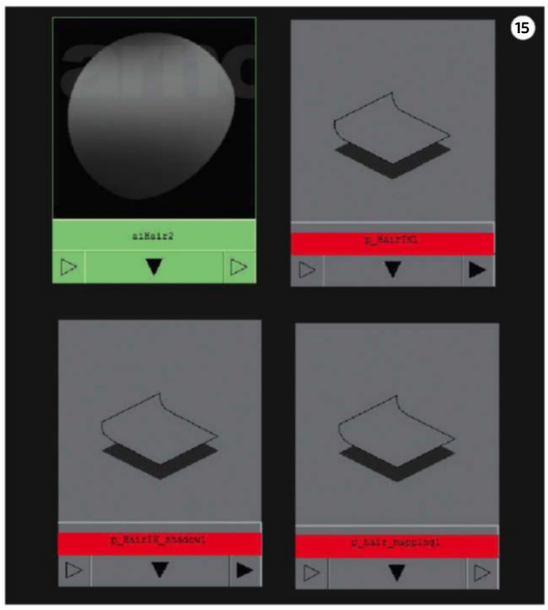


Dye the hair

Go more in-depth with the texturing and shading process



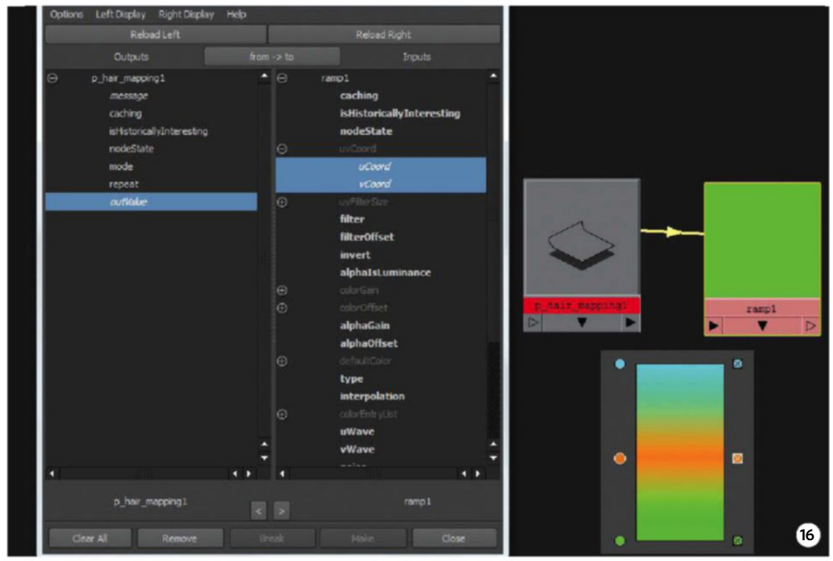
15 Pick your shaders Here the character's hair was rendered with mental ray, while everything else was rendered with Arnold. By default mental ray doesn't offer a hair shader, but there is a great shader pack written by Pavel Ledin, named shaders_P, which includes a hair shader called p_HairTK. This offers a lot of control, from Diffuse to Specular settings and even GI. A cool feature in this shader is the ability to output all the render passes that this shader supports. Here p_HairTK, p_HairTK_shadow and p_hair_mapping were used.



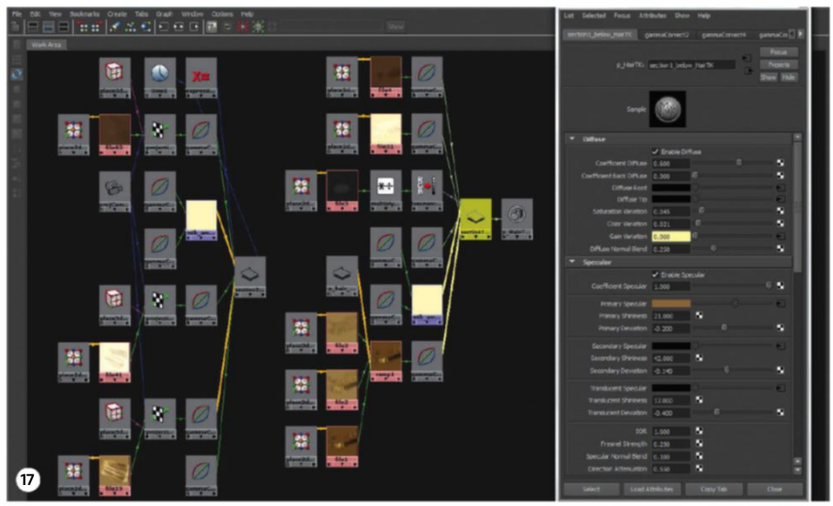
The Arnold aiHair shader

aiHair is a well-optimised shader that works beautifully with hair, the only caveat is it does not offer Translucency or Transmission controls. Arnold IPR is impeccable, so just assign aiHair, turn on IPR, then start tweaking the shader. The logical relationship behind the Primary and Secondary Specular slots is that the Angular Shift in the Secondary Specular should be multiplied by -1.5, so write a single expression on it right off the bat to get a realistic look.

14 Texture in layers Now that the hair is groomed, all the root geometries can be UV-mapped and the texturing phase can fully begin. Depending on each section's look, instead of only making root and tip textures, a maximum of three textures can be created to be mapped along the hair length. Usually these textures can share a lot of similar details, except their colours, to mimic a nice transition between tones. Apply the same procedure to paint Specular and sometimes Translucency maps where needed.



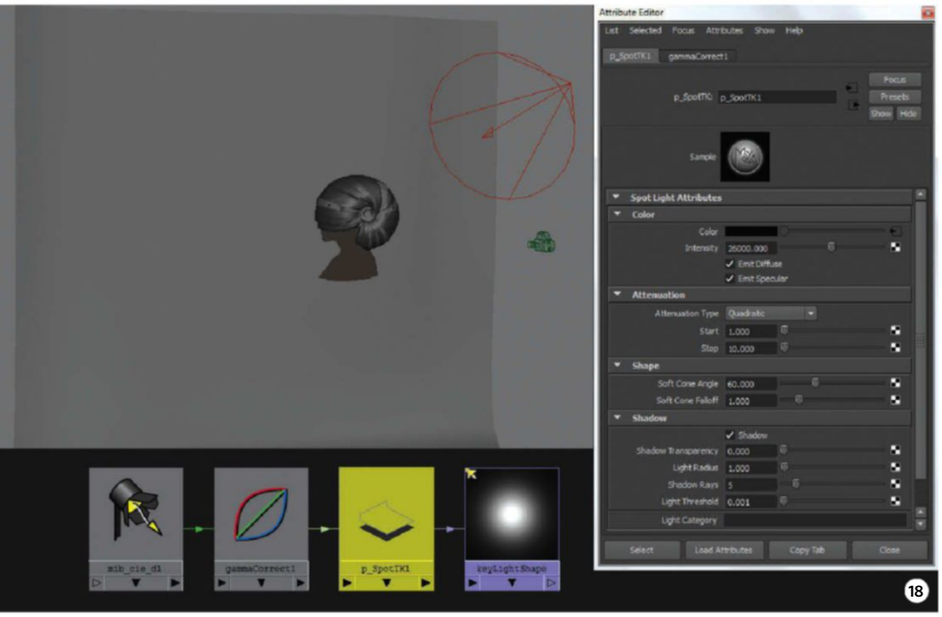
16 Prepare the model for shading There are a maximum of three texture layers to be mapped along the length of the hair, while p_HairTK only offers a Root and Tip Color slot. To override such limitations, create Ramp and p_hair_mapping nodes, delete place2DTexture off the Ramp node and connect the outValue of p_hair_mapping to the uCoord and vCoord of the Ramp. Now whatever the Ramp colour is from bottom to top will get mapped to the hair from its root to its tip accordingly. Now you can easily replace Ramp colours with your own textures.



17 Fine-tune the settings Inevitably all the hair shader components can't be discussed here, due to the excessive number of attributes. Adding variations in the Diffuse section is a nice touch, just remember that Color Variation is pretty sensitive, so use it with care. The colours in the Specularity section should artistically match one another and in reality the hair colour or any other material applied to the hair, such as gel, will define these properties. No Transparency was used here, in order to maintain the hair's vivid look.

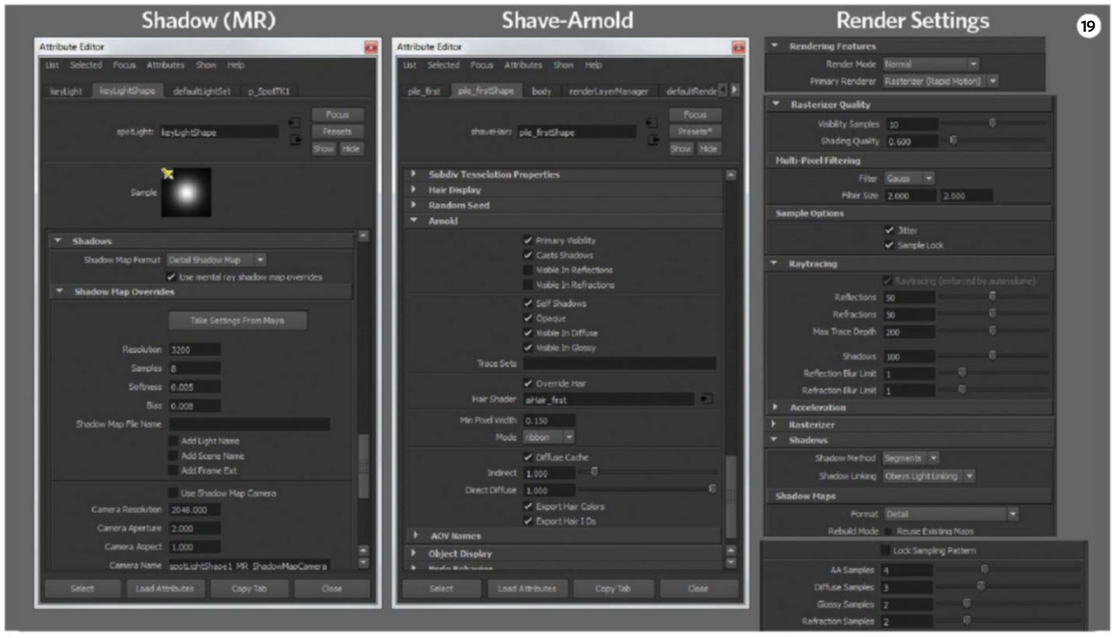
Lights, camera, render

It's time to turn on the lights and finalise the image



18 Lighten the hair Beautiful lighting should attempt to display nice forms, but hide imperfections. In fashion photography, those who want to emphasise hair use the so-called hair lights to attract the viewer's eyes to the model's hair. In this scene there are two lights, one almost white/yellowish key and one strong blue kick. Plug P_SpotTK1 from p_shaders into the lights and plug p_HairTK_shadow into the Shadow shader on p_HairTK's shading engine to have maximum control over the lights and shadows. Here the lights themselves use Detail Shadow Maps with a high resolution.

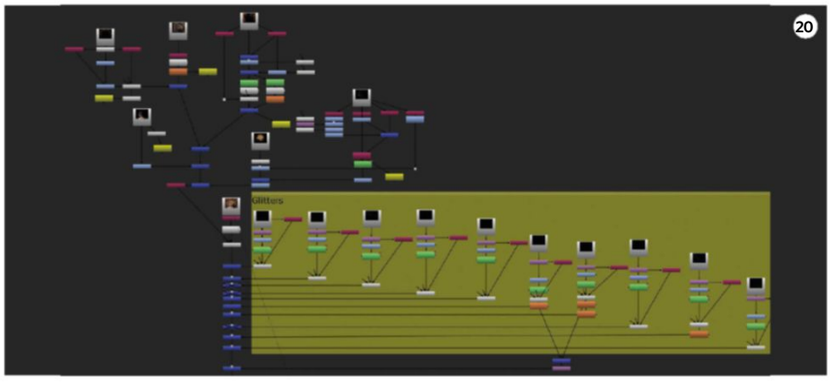
19 Render the hair Arnold does an excellent job of rendering heavy scenes containing hair. To get rid of any rendering artefacts, you can increase the Sampling or Min Pixel Width under the Arnold rollout in the Shave Attributes. Rendering hair with mental ray by default is such a cumbersome task, especially if the hair is this complex. However, by changing certain parameters it can become faster. First, in Render Settings, you need to switch to Rasterizer mode, then set Shadow Map Format to Detail. Finally, a good amount of Visibility Samples will keep things looking polished.



20 Unify your scene This artwork was rendered in layers and passes in 32-bit EXR format, while keeping a linear workflow in mind. In terms of hair render layers, there was one for the dangling hairs and two for the girl's hair, separating the key and kick lights. In order to cast hair shadows on the body, the hairs were added to the body layer with Primary Visibility off. All the render outputs can then be brought into NUKE for compositing and further post-production tweaks and adjustments.

Look consistency between different renderers

Different renderers use various algorithms to compute an image, and while it is possible to get similar results to some extent by following some guidelines, the maths gets more complicated as the scene becomes heavier. However, you can use LUTs (lookup tables) to roughly match the look between different renderers. Just simply generate a LUT in Nuke then read it in View Color Manager in Maya. While creating a LUT, you can grade the image in any way you like and have it affect the rendered image directly.



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This is KeyShot 4.

Model by Simon Williamson
http://be.net/Row0

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Step by step

Easy-to-follow guides take you from concept to the final render

Artist info

Stefano Tsai

3DArtist online

Username: StefanoTsai

Personal portfolio site www.stefanotsai.idv.tw

Location UK

Software used 3ds Max

Expertise Speed modelling to quickly visualise ideas, particularly with regards to mechanical design

Build a videogame environment

Engine room 2013

"Use 3ds Max to quickly visualise a concept and bring the white box into higher-resolution models for pre-vis"

Stefano Tsai works for The Creative Assembly, SEGA as a senior artist

When creating videogame environments, developers need to quickly take concept ideas and present them as 3D pre-visualisations to ensure they will work in the game.

Here we're going to show you how to quickly nail down such videogame environment ideas, from the concept through to the initial 3D pre-vis models. In the first steps we will show how to analyse the scene, then plan out what to model and how best to model it. Following this, we will focus on modelling, forming the various assets and quickly presenting them effectively in the 3ds Max viewport.

The final steps of the process will cover lighting in the viewport. 3ds Max's viewport lighting and ambient occlusion support saves time and makes for a more efficient workflow. This is a straightforward stage for a 3D pre-vis artist, but also simple enough for a novice to understand. We'll conclude with some ideas on how you can pitch your environment based on this design.

Concept

Here you can see a quick concept of an engine room. This room was built into the rock to give the inhabitants some natural protection. They used lasers to cut through the rock, then installed the reactor engine inside, which is why the walls are so flat.

With the Disc

Tutorial files:

- MAX files for each step of Stefano's process

Learn how to

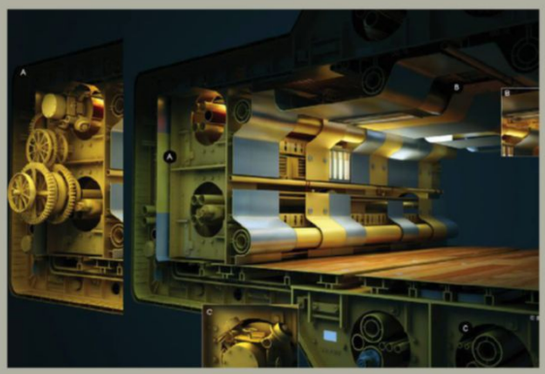
- ☑ Understand what's important for the scene
- ☑ Block out the key elements
- ☑ Speed up and optimise your modelling workflow
- ☑ Use the 3ds Max viewport to present the concept
- ☑ Light your final scene using 3ds Max's viewport

Artist Showcase

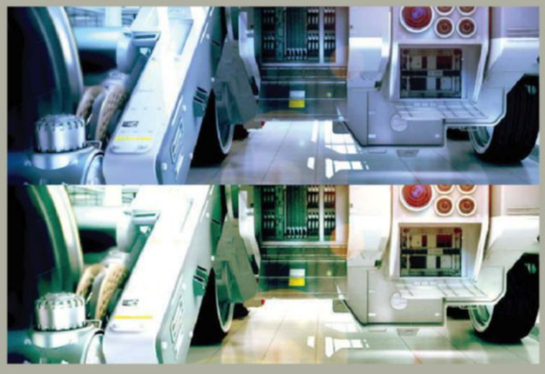
Stefano Tsai

I'm a concept designer and 3D artist. I have been working in the game and entertainment industries since 2001. Even though I have spent over ten years working within the CG arena, I still feel so excited about future projects. I am current working on a new alien IP at The Creative Assembly Ltd, SEGA.

Corridor Study **3ds Max (2013)**
I used simple shapes and materials to form one section of corridor. This is the realistic version, as I tried to match the real world as much as possible



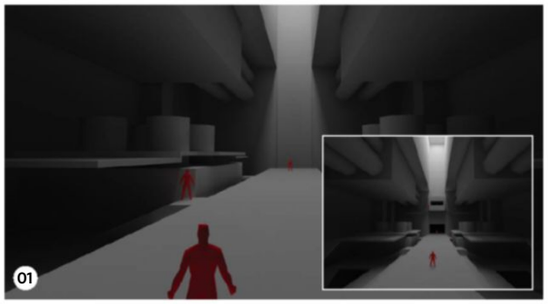
Corridor Study **3ds Max (2013)**
Here is another study of a mechanical corridor, but this time in a more steampunk style



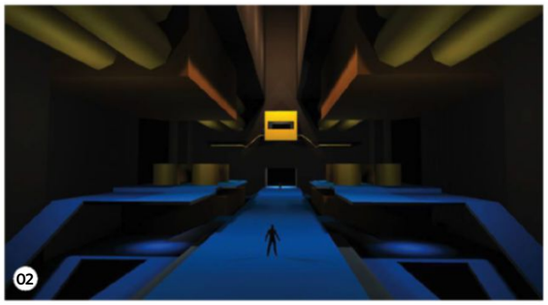
Car Study **3ds Max (2013)**
A study of a futuristic car's front panel, here tested with two different tones

Analyse the scene

Apply colours and basic shapes



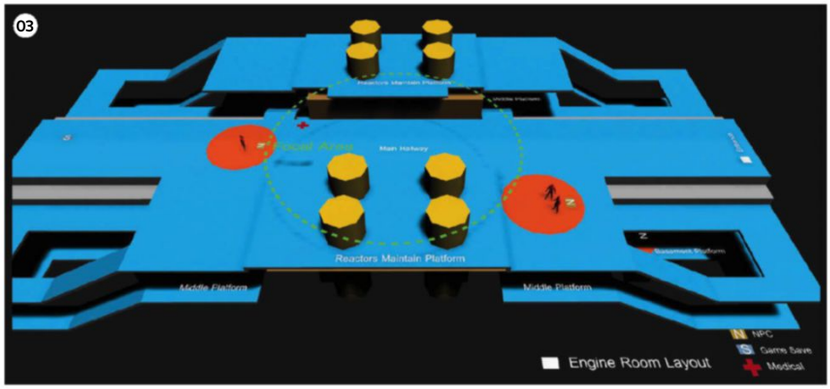
01 Establish a design Don't rush to building something straight away, just spend time talking to game designers to see what the original idea and story behind this level is. The most important thing is to find out which areas the player is going to interact with most. This could be with NPCs (non-playable characters), just the machines or even a computer's monitor.



Blocking out the key elements

At this stage we're going to create the first blocking of the models and form all the key elements. With the first blocking models in, we can start to visualise the proper size and shape, then put them into the correct place. The most important thing for this stage is to keep things as simple as possible. We'll only create the basic shapes so that people can instantly understand what their function is. For example, if at this stage I want a plumbing system, I won't build gate valves, miniature valves, draincocks, jumpers, nuts, washers and so on. I'll only model basic pipes using 3ds Max's Spline tool and turn on Enable In Viewport from Rendering, then play around with the Radial setting.

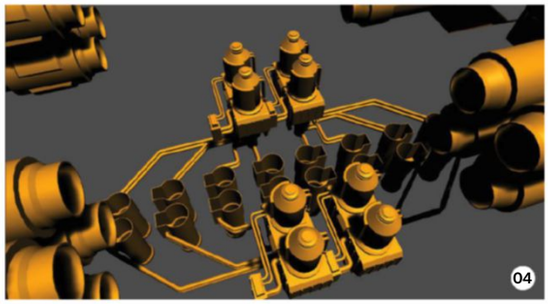
02 Colour the white box Use different colours to aid with your thinking when separating the primary, secondary, path and background elements. The primary and secondary elements are key for the environment, so everything else should be built around and support them. Here we've used yellow as the primary elements, orange as the secondary and blue as the path for the players. This is the quickest way to understand the space of the environment and the relationships of its various components.



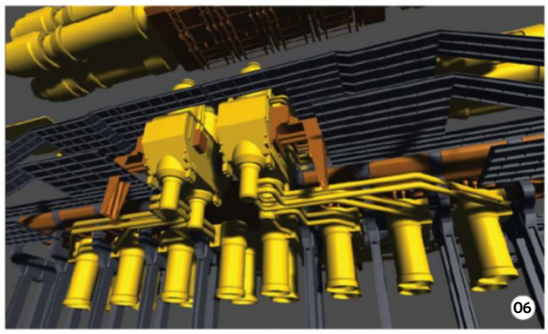
03 Clear up all the important spots for NPCs or story There's nothing more important than understanding story and how players react with NPCs in the environment. It's hugely beneficial to place these into the 3D scene so you can see all of their relationships with the space surrounding them. Here you can see we've put down all of the NPC locations, game save spots and medical kits, in order to figure out where the focal point for the scene will be. This information is going to really help when lighting later, as it can be used to lead players into the specific areas you want them to go.

Add simple details

Make the scene light and efficient. Don't overcomplicate it



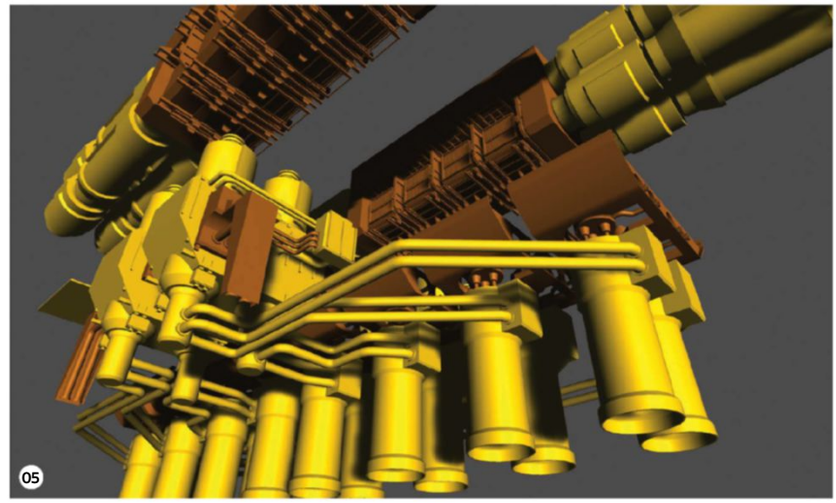
04 Use primary elements There are many similar objects in the scene, so here we used an instance copy for those models to save time. For example, when you've finished one model, you can duplicate it multiple times in the scene. When you modify one model, you can see all of its children change at the same time. This is the easiest way to read their relationships with one another, as well as with the space around them. For this stage, it's best to break the basic shapes and make them more compact. The key is to integrate all of the basic shapes you get into the scene, so people can't tell that you're using simple boxes and spheres.



06 Build a pathway Focusing more on the actual gameplay for a moment, you need to ensure that the pathway is large enough for players to walk through. In contemporary games, this can mean two or three people walking through together. Normally this is wider if you compare it to a real-world scale. Here we can use the information taken from Step 3 to form the path through the engines. For creating these platforms, try using the Shell Modifier to minimise the work required. Don't spend too much time on modelling every metal frame, simply model from a plane and let 3ds Max generate the thickness for you. You don't need to do everything by hand, just find the easiest way to save time.

Choose a focal area

This is a pre-vis scene, meaning you can't include absolutely all of the details that you want. You only have limited time, so you have to pick certain elements that are most in need of further development, especially in the focal areas. Again, you need to keep it as simple as possible, while at the same time keeping all of the modifier stack, if you adjust the models. You can add another editable poly on the top of your stack list, as this way, if things go wrong, you can always go back to a previous step.

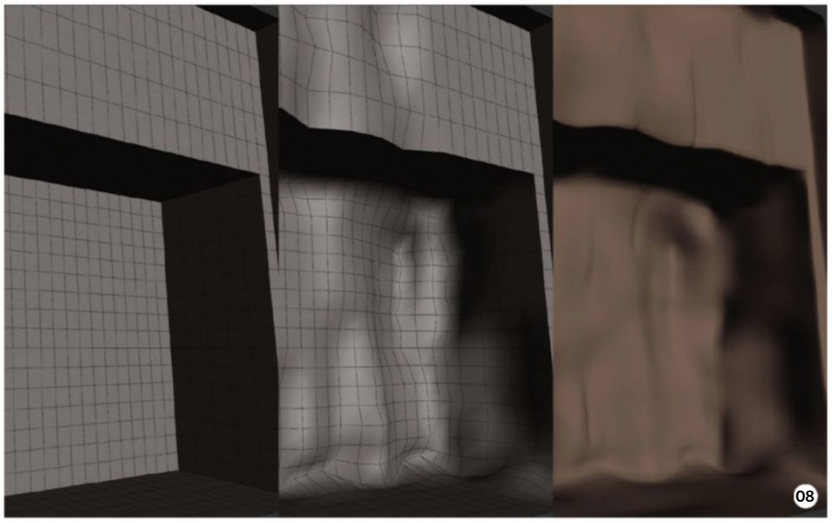


05 Build up the secondary elements Treat this stage as a chance to extend the primary elements. Imagine that you're the engineer and need to work out the way to connect these heavy-duty machines. You can pick a few features from the primary elements and then use the same language to put them together. This can be approached structure-wise or you can extend some support units. For example, if you have a big engine unit, you should have a generator and batteries to make the system work. After you've built all the elements you want, you can model the structure to support their weight and place them into the environment. Here we've used a steel hull to hold them all together.

07 Use the viewport lights to review Different colours and tones can tell a story all by themselves. For example, here bold yellows, reds and blues have been used for lighting. Place yellow Omni lights from the top and middle to light up the primary elements. Try to think about the real source of the lights. Here we can presume there are some lamp stands near the machines to help workers and strong lights from the ceiling to illuminate those ceiling machines. However, remember that if you show everything, you're really showing nothing, so don't be afraid of darkness. You need a contrast of lights. Here we've left some darkness between the main platform and the lower deck, then placed some red Omni lights. Red gives off a dangerous mood, as we want players to feel as though there's something even more dangerous than mechanical machines down there. This is the best way to give players another layer that they can see and feel but can't reach. Blue is often used because it has a more artificial feeling. This could make players feel as though there are computer monitors nearby. This hints to the player that there is a control room above this area, for instance, which could be their next destination.

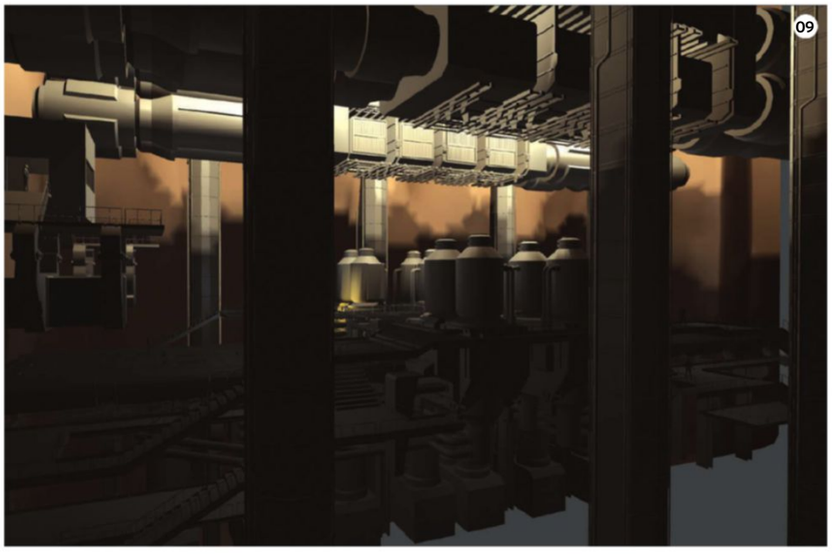
Refine the environment

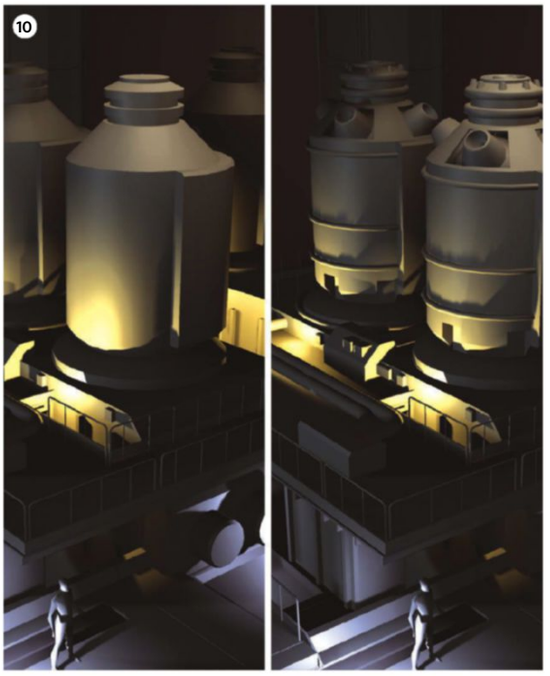
Focus on the smaller points and evoke realism



08 Refine the background In this particular scene, the engine room is sitting inside a bed of rock. To make this believable, we need to have real material on the surface, not just flat and box-like surfaces. Here we've used the Soft Selection options with an editable poly to quickly adjust the faces to look more like rock.

09 Finish the blocking details With the viewport Omni lights and the background set up, we now need to finish blocking out our models. Here we've added some huge pillars along the rocky surface to establish some buffer between the rock and steel materials. This can be done after completing the first pass of lights, because it's now clear where the darker areas are going to be and, even more importantly, where the player will be moving. We don't need to put too much detail into the areas containing darkness, or spend time on something that the player can't see or reach. Darkness can be a great tool in this regard.





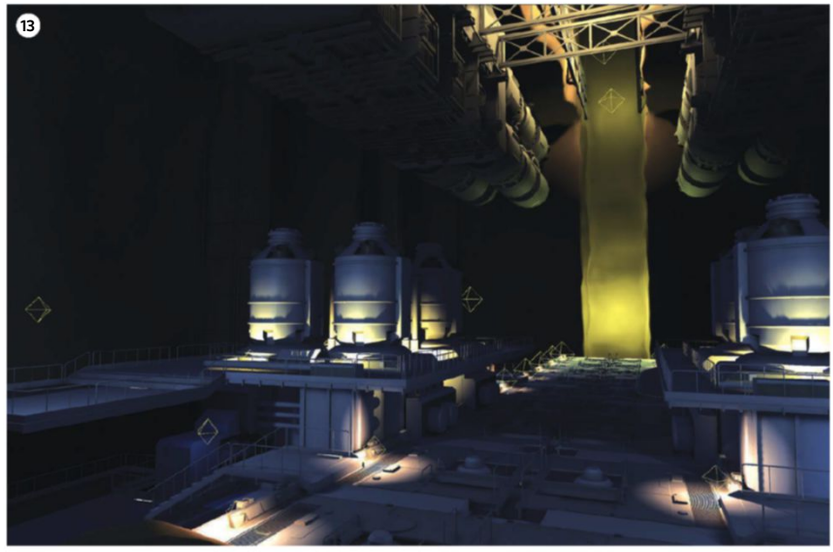
10 Develop the main reactor If you keep all of the basic shapes from the original cylinder, it will make the object very boring. As such, take the top area and open four doors for the cooling system's pipes to release some hot air, but still keep the side of the cylinder simple, only adding some frames to make it a bit more heavy-duty. Keeping the middle surface clean is a big benefit later. You don't want to overdo the models, as the clean space can be used for decals and textures.

11 Shape the turbine In the same vein as the previous step, you need to stick to the main shape of the object and develop around it. Here you should complete a bit of research on jet engines and select a few features to include in your design. Some turbine blades have been added along the surface, with some inset to provide depth for the objects.

Use lighting effectively

Add final details to the scene to make it come alive

12 Further detail and scale We have built a lot of large and impressive machinery here, but this is potentially a bad thing, as the player may not feel as though they belong. The main reason for this is because they don't have anything to interact with in the environment. You need to provide some small details to make players feel as if they're part of the world; they need to feel they can interact with the environment and feel that the scene was built around a human being. You could include a computer monitor or lamps; anything that the player feels they can reach out and touch. This helps promote a sense of scale and sells the reality of the scene.

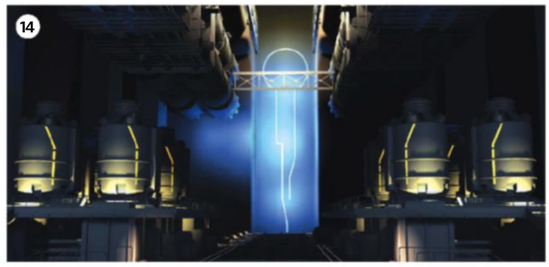


13 Make viewport lighting dramatic Drawing the scenery is just like using charcoal pencil, as you can wipe away some details for better balance. After bringing in more details for the models, we need to return to adjust the lights. Don't be scared to add more contrast, because if you give the same value to everything, your final scene will be boring. Tweak the Omni lights to create a more exciting mood.

14 Insert decals Now follow the concept to add some neon lights to enrich the scene and bring more colour into it. Include more Omni lights around the big blue neon structures in the background to let its blue colours fade into the scene. The same goes for the yellow neon lights on the reactors, which help to bring in more of a sci-fi mood.

Play around and show opportunity to your lead

Don't forget to show multiple versions of your concept. You can easily drop another version of a reactor, a turbine generator or even play around with the composition of the elements. Most of the time your first version isn't your best, so you'll need to adjust it. It can make huge difference spending just another 30 minutes moving things around or changing their proportions. You don't need to model your scene precisely. This process is more about putting down ideas and developing them with your lead than making the perfect models. It's meant to be quick and rough; more like a pencil sketch than the final inking.



15 Post-production in Photoshop 3ds Max currently can't handle visual effects in the viewport, so for these you'll have to use a script to grab a high-resolution screenshot. You can then bring this into Photoshop to add some further details such as smoke, volume light and other small details. These are the final touches for the scene and can bring the image a bit closer to the final look, as well as help sell the mood. If possible, you can normally use another angle to give a team leader a little more perspective.

8 hours creation time
Resolution: 6,000 x 3,840

• **DID YOU KNOW?** • All tutorial files can also be downloaded from: **www.3dartistonline.com/files**

I made this...

Incredible 3D artists take us behind their artwork

Artist info

Leng Shang-Peng

Website www.power3d.cc
Country China
Software used Maya, Silo, ZBrush, MARI, Photoshop, NUKE
Bio Once a CG supervisor at 37 Digital in Shanghai, Leng now works in 3D tool development

> I used a V-Ray light and Global Illumination for the final lighting. Rendering the whole image took up more than 50GB of memory. For any large-resolution rendering piece you must ensure there is enough memory on your computer, otherwise the render will be slow

Then Flying The Youth

This is one of my personal works, where I strived to achieve a realistic effect and highly precise details. The intention was to capture the touching expression of the young girl in a soft breeze and share this beautiful moment with everyone. Before starting work on my image, I gathered suitable reference images within one to two days. I then listed the points and effects that I needed to reference.

> I integrated MARI and Photoshop to paint all my textures. All shader parameters were based on the real world (Model Size, Scattering Distance, Skin Refractive Index, Fresnel Reflection). I then fine-tuned each parameter to get the final effect on the image

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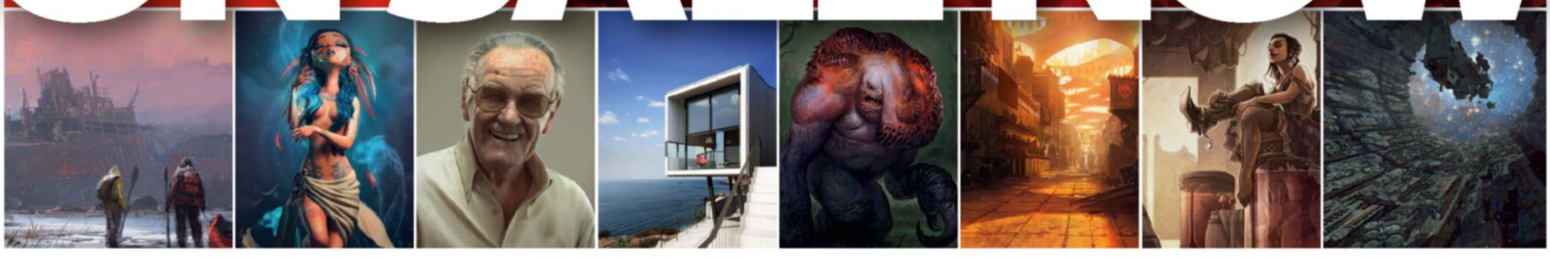

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/ B A L L I S T I C /

> Not only does the AMD FirePro system create a capable environment, it increases performance in ways previous systems could only dream about

UNLEASH YOUR CREATIVITY

The combination of AMD FirePro™ and Adobe Creative Cloud™ provide digital content creators with their most powerful toolset ever

Digital artists in today's marketplace frequently find themselves lost in a labyrinth of various software and hardware combination options. Most artists understand the software they want to use, but don't have as firm a grasp on the type of hardware they should opt for to best support their preferred applications. Researching the matter frequently leads to frustration, as every manufacturer claims their product is the fastest, most-efficient and most-optimised kit available.

There's also the challenge of figuring out the best approach for a system using limited funds. Should processor speed be sacrificed to purchase a better graphics card? How much RAM is enough? What about the core operating system? For a creative individual who just wants to be able to craft great art in Adobe® Photoshop, or the video professional who needs a better system to handle their editing demands in Adobe Premiere® Pro, these questions can feel overwhelming.

However, there is relief for those artists that don't care what a bit does and just want their tools to work! The software available in Adobe Creative Cloud™ coupled with AMD hardware promises to provide a tight integration between software and hardware, specifically between Adobe Photoshop and Adobe Premiere Pro and AMD's FirePro workstation-class graphics cards. It's a collaboration that enables creatives to create their best work yet, with products optimised for both speed and performance.

The immediate benefit for the user is that this takes much of the guesswork out of the hardware choice. When choosing a graphics card, you want the one that is optimised for the tools you use every day. With the Adobe and AMD collaboration, you can reap the benefit of using a system that's vastly more capable of handling the demands of your projects.

Finally the terms 'real-time' and 'video effects' can go hand in hand. Not only does the AMD FirePro system create a capable environment, it increases performance in ways previous systems could only dream of.

THE OPENCL REVOLUTION

Why OpenCL is the superior choice

One of AMD's strategies for achieving increased performance is known as Open Computer Language, more commonly referred to as OpenCL.

To understand OpenCL, you first need to understand a bit about processors. Generally a system has two distinct types of processors: a CPU that's comprised of the main processing core of the machine and a GPU, or Graphics Processing Unit. Think of these as two separate engines attached to a single vehicle.

Previous computing strategies have seen the CPU handle the majority of the computing tasks while certain graphics-intensive tasks were handed off to the GPU. For the most part, this approach treats the GPU a lot like a spare engine, that's only called upon during very specific jobs to assist the primary.

The problem with this approach is that much of the time this extra horsepower is left locked away from the primary machine, unused except in predetermined instances. In our engine metaphor, it would be akin to turning off the secondary engine except when driving up specific hills that were already marked on your map. If you happened to encounter a hill or rough road not on your map, or simply needed some extra speed, that secondary engine sits completely idle and is of no use.

With OpenCL, however, the GPU is available for moments not predetermined by the architecture. This means the additional processing power of that GPU is unlocked and can be used for tasks the primary CPU might be overwhelmed with or less suited for*.

SPEED, PERFORMANCE AND EFFICIENCY

A fact-based look at what AMD FirePro brings to your workstation

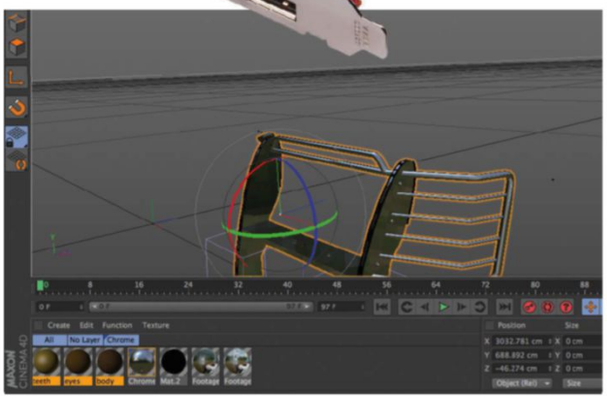
Benchmark tests show that AMD FirePro W5000 cards using OpenCL architecture perform up to 8-times faster than using software alone while rendering video to disk**. Similar tests show the OpenCL performance as 40 percent faster than NVIDIA's CUDA, and the FirePro GCN proved to be up to 28 percent more efficient than the NVIDIA Quadro.

** Software: Adobe Premiere Pro pre-release build 294 / Windows 7 64-bit, Effects: ProcAmp, Sharpen, Color Balance (RGB), RGB Color Corrector, Lumetri (multiple Deep Color effects)

System: Intel Xeon E5530 @ 2.40 GHZ, 12GB memory, 160GB Velociraptor, Drivers: AMD 12.102 / NVIDIA 311.35, Content: 4K TIFF 24-bit sequence

*To learn more head to http://blogs.adobe.com/standards/2013/05/03/opencl-enables-more-compelling-and-efficient-applications/

By using OpenCL architecture, FirePro graphics cards are able to render video to disk 26-times faster than software alone



CINEWARE is the innovation that brings After Effects and CINEMA 4D together

After Effects' new Live 3D Pipeline enables even closer integration with CINEMA 4D

After Effects and CC benefit greatly from OpenGL capability

With the help of OpenCL, GPUs are made available whenever parallel processing is most beneficial or desired for the task at hand

> "Working in 3D and 2.5D is now as smooth and responsive as 2D, which enables more creative freedom as artists can spend more time crafting their art, not waiting for renders"

So what does this mean for you? Quite simply it means better performance for more tasks. To point to just a couple of direct instances, Photoshop CC's new Sharpen and Blur filters make extensive use of OpenCL architecture and are much faster and more responsive than ever before. Likewise with Adobe Premiere, the Mercury Playback Engine allows you to experience the AMD FirePro using OpenCL and a multi-core CPU. You can edit full-resolution video seamlessly, without hesitation, and apply video effects in real-time without needing to wait for a preview render.

A FEAST FOR THE EYES

Why you should be interested in 10-bit visuals

Traditional systems have dealt with colour by using the familiar three channels: red, green and blue. These systems create pixel information with eight bits in each, hence the 24-bit displays. While this creates more than 16 million colours, it's truly just a fraction of the total colour spectrum our eyes see in real life. AMD's FirePro cards support ten bits per colour channel, which enables a 30-bit colour output and billions of colours. This increased colour depth is particularly important to professional photographers and those using medical imagery. With 10-bit colour your creative experience will be revolutionised in ways you could never imagine. All AMD FirePro cards support 10-bit, and a monitor that also supports 10-bit colour will be required.

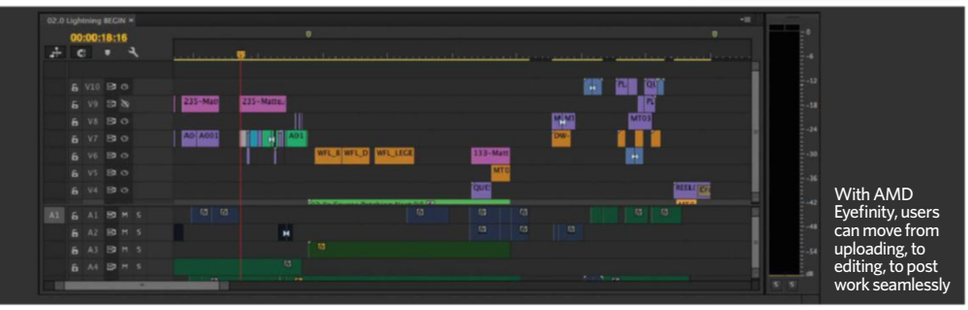
MAKING IT WORK

How you can get the most out of the AMD FirePro

Few things can be more frustrating than researching, purchasing, installing and attempting to use a new piece of equipment, just to find that it doesn't work as expected. After all the promised gains in speed and performance, nothing feels even slightly different. You've updated the drivers, checked the connections, rebooted several times, yet still nothing. What happened? Chances are that you missed a critical step in the process: the setup. You'll never be able to take advantage of this new technology unless you tell your software how to do so.

In Photoshop CC, this control is in the Preferences menu (Edit>Preferences> Performance). Look to the lower-right in the Graphics Processor Settings and verify the system is reading your graphics card correctly. Check the box for Use Graphics Processor and then hit the Advanced Settings button. In this box, set the Drawing Mode to Advanced, check the boxes for Use Graphics Processor to Accelerate Computation and then check Use OpenCL. If you have a 30-bit display, check the relevant box to activate it to get the most use out of your graphics card. Once these settings have been selected, it's time to test the merits of your setup. One of the best ways to test it in Photoshop is to open up a large file and run an intensive operation, such as Puppet Warp, Liquify, the Blur

Smart Sharpen in Photoshop gets a boost thanks to the GPU benefits


With AMD Eyefinity, users can move from uploading, to editing, to post work seamlessly

Gallery filters or the new Smart Sharpen. You should see a significant increase in performance with these tasks and many others besides.

When starting a new project in Adobe Premiere Pro CC, access the dropdown box under Video Rendering and Playback. Change the setting from Mercury Playback Engine Software Only, to Mercury Playback Engine GPU Acceleration. These same settings can be accessed later, simply by navigating to File>Project Settings>General.

OPENGL DESIGN

What OpenGL means for the Photoshop and After Effects user

OpenGL, or Open Graphics Library (not to be confused with OpenCL mentioned earlier) is a set of standards for high-performance processing that carries intensive graphics operations to the GPU for better handling. Frequently, these operations involve the use of 3D graphics and other processor-intensive functions. The proper use of OpenGL requires a graphics card with the horsepower to handle these demanding tasks. AMD's FirePro cards fit this demand nicely. AMD has been working with Adobe to ensure that the card and software work together to provide an OpenGL-accelerated workflow, as well as a far faster and more efficient graphics pipeline.

By using the AMD FirePro cards' OpenGL capability, Photoshop and CC see substantial performance gains in accelerated features such as the Adaptive Wide Angle Filter, Field Blur, Iris Blur, Tilt/Shift and the revamped Lighting Effects Gallery. Former processor-intensive features such as the Liquify filter are now smooth, responsive and fluid. There are also other features that are only available through the use of OpenGL processing, like the Rotate Canvas tool, Scrubby Zoom, Flick Panning, or the Bristle Brush tip preview. These features are more than simple window-dressing, however, and in fact provide substantial interface improvements that save time, enhance artistic focus and contribute to a more-efficient production pipeline.

In After Effects, the use of OpenGL and GPU is a significant contributor to your workflow. New features in CC, like the new Live 3D Pipeline that can import CINEMA 4D scenes as layers, will change the way video professionals approach their projects. Working in 3D and 2.5D is now as smooth and responsive as 2D, which enables more creative freedom and means that artists can spend more time crafting their art, not waiting for renders.

After Effects CC leverages the new processor gains to provide features that would have been previously too intensive to be workable. Features include the new 3D Camera Tracker, Pixel Motion Blur and a retooled Warp Stabilizer VFX. Overall, After Effects CC uses several methods of optimization and acceleration, enabling users to create more in far less time.

HARDER, BETTER, FASTER, STRONGER

Why utilising the GPU is a better choice than simply using a multi-threaded CPU

One of the great challenges of computing is that there are several tasks that need to be calculated simultaneously. A traditional approach to solving this is to use a multi-threaded CPU architecture to handle the multiple tasks; an approach certainly better than the juggling act performed previously by single-threaded CPUs. However, with a GPU on board, the graphics card processors are designed to handle multiple parallel processing for compute functions. Now the OpenCL architecture makes these powerhouse processors available for more than just dedicated graphics tasks. They may now assist the CPU with other heavy lifting too. Ultimately this makes the entire system faster and stronger, which means you can work with speed and confidence on even the most demanding of tasks and operations.

STABILITY AND POISE

Discover a few strategies for creating a well-balanced system

The best approach for reliable, high-performance, graphical computing is to create a balanced system. A powerhouse graphics card won't do much good if there isn't a solid system to support it, after all. This approach entails several elements working in tandem. The CPU must be adequate to support the rigorous demands of the job, so you will want to use a quad-core processor such as the AMD Phenom® II. The operating system needs to be a 64-bit OS like Windows 7 or 8. The system should have more than 8GB of RAM, multiple disk drives (preferably in a RAID 0 configuration) and at least 15GB of available empty disk space for temporary working files. Of course, you'll also need a powerful AMD FirePro graphics card.

A NEW VISION

Take a brief glimpse at AMD Eyefinity multi-display technology

AMD Eyefinity multi-display technology enables an AMD FirePro graphics card to drive three, four or even six monitors via DisplayPort 1.2 from a single graphics card, at up to 4,000 x 2,000 resolution for each output. You can speed up your workflow by using your extra screens to view additional Audio Mixer or Metadata panels; run After Effects® and Photoshop sessions simultaneously; or simply refer to your storyboards and project brief. Even something as simple as being able to monitor your email on a dedicated screen without ever having to minimise your project can yield a significantly more efficient workflow.

FOR ON-THE-GO ARTISTS

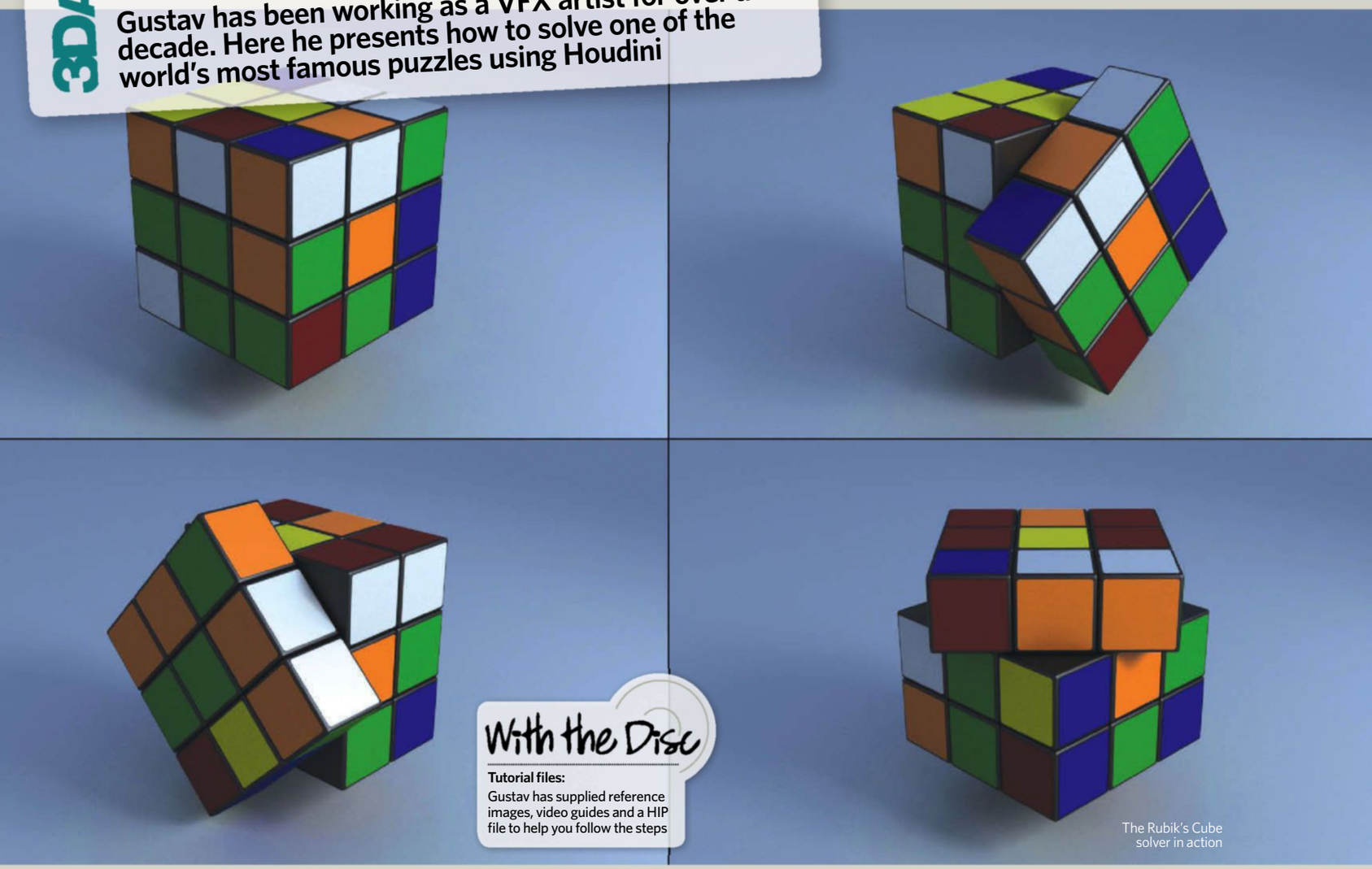
Here's a run-down of the top time-saving features enabled by AMD's FirePro

- Apply even the most intensive effects to video projects and see the results in real-time without having to generate a preview render.
- Work on full-resolution video files in Premiere Pro and scrub through the timeline seamlessly without stuttering or hesitation.
- Use the heaviest filters in Photoshop CC on even high-resolution images without having to wait for the system to catch up. Operations such as Liquify and Puppet Warp are now silky smooth and responsive.
- Direct import of CINEMA 4D files as layers into After Effects CC means less juggling of file formats and more creative editing.
- Multiple screens enable a larger desktop and even more applications visible at once, reducing the minimise/maximise dance of windows.

3DArtist

Masterclass

Gustav has been working as a VFX artist for over a decade. Here he presents how to solve one of the world's most famous puzzles using Houdini



The Rubik's Cube solver in action

With the Disc

Tutorial files:
Gustav has supplied reference images, video guides and a HIP file to help you follow the steps

Build and solve a Rubik's Cube

"Gustav Melich demonstrates how to both construct and solve a Rubik's Cube in Houdini"

The Rubik's Cube is one of the world's most fascinating puzzles, designed to test the mind to its extremes.

The 26 small cubes that make up the whole puzzle each hold within them a complex challenge that captures the imagination and makes for an object that's truly difficult to put down. It also presents a unique challenge for a 3D artist looking to re-create this most famous of toys.

The Cube was invented back in the mid-70s by a Hungarian professor of Architecture and Design, Erno Rubik. His intention wasn't just to make a toy, however, it was the structural design problem that really interested him. Namely, how could each of these blocks move independently without the whole mechanism falling apart?

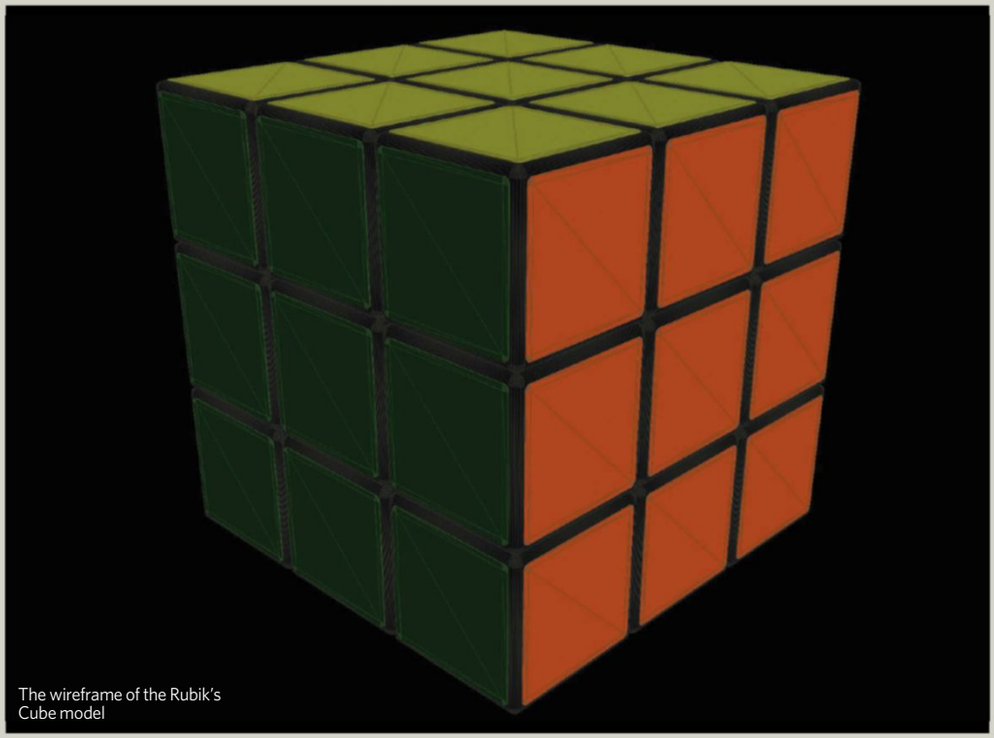
In the Cube there are 26 individual pieces and each layer of nine little cubes can twist and the layers can overlap, with any three squares in a row being able to rotate in any non-diagonal rotation to join a new layer. Rubik didn't realise he had created a puzzle until the first time he scrambled his new cube and then attempted to restore it. He then marked each side with different-coloured adhesive paper and the famous Cube was born.

His patent was approved in early 1977 and by 1980 it became the fastest-selling puzzle the world has ever known. As of today, over 250-million cubes have been sold and one-eighth of the world's population has laid hands on it.

The Cube can be solved in only 17 moves with the aid of a computer and theoretically there is no scrambled state that requires more than 20 twists to solve. The current world record of solving the Cube by a human is around six seconds.

I spent much of my childhood playing with my Magic Cube (this was its original name in Hungary, before it was sold worldwide and became Rubik's Cube) attempting to solve it over and over again. I was mesmerised by how something could be so simple and yet so complex. How could 26 little cubes result in a system with around 43-quintillion permutations?

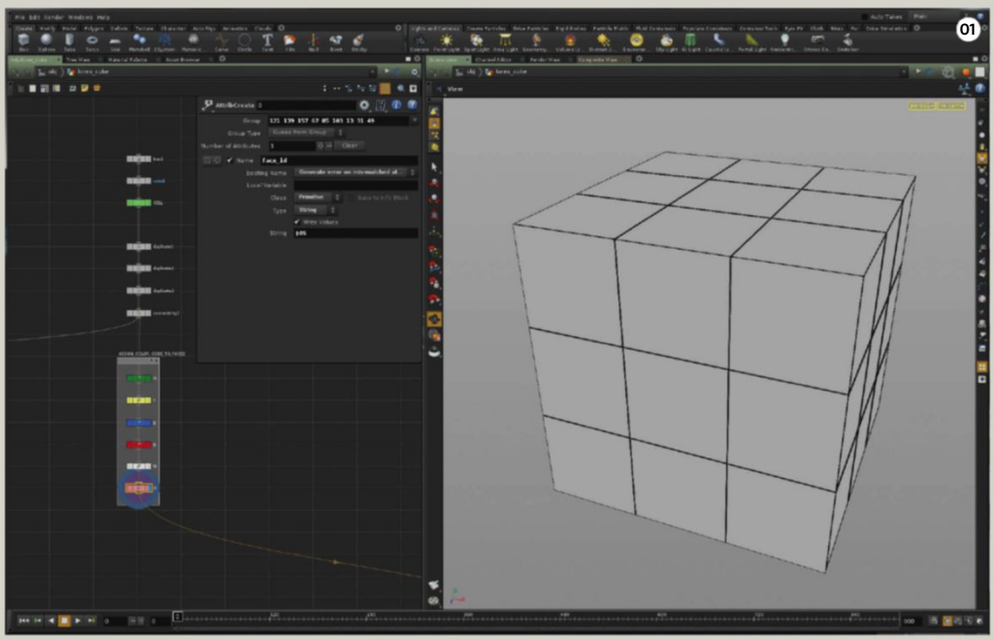
I can easily say that this tutorial was inspired by my lifetime amazement for the Rubik's Cube. Over the next few steps we



The wireframe of the Rubik's Cube model

Python in Houdini

Python was originally introduced to Houdini in version 9 back in 2008. Since then it has become essential in using the software. The Python scripting language replaced the functionality of Houdini's previous scripting solutions; the expression language and HScript. SideFX created the Houdini Object Model (HOM), an application-programming interface that provides access for the user to every detail in Houdini. The process of implementing custom nodes came to be much easier and faster. Developers now have a choice of using Python for rapid development and only use C++ with the HDK (Houdini Development Kit) when the speed of the custom tool is absolutely critical.

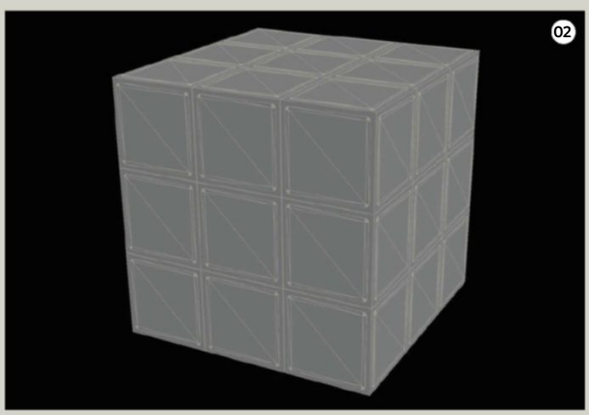


will do a little bit of everything, from modelling to the final solve.

The Cube and the side stickers will be built procedurally from simple boxes, only with the necessary details. The sides of the boxes will be tagged with colour information that will help the solver read the initial configuration. UV co-ordinates will be applied to the stickers as well, to enable project images to be attached to the sides instead of colours.

A scramble tool will be created to transform an original cube to a scrambled state that can be passed to the solver. We will introduce a special notation for the operations that will then be used by both the scrambler and the solver. The solver node will be implemented in Python, which is an easy way to create custom nodes within Houdini.

For the photorealistic HDRI lighting we will use Mantra's PBR, which enables fast render times and a beautiful final image.



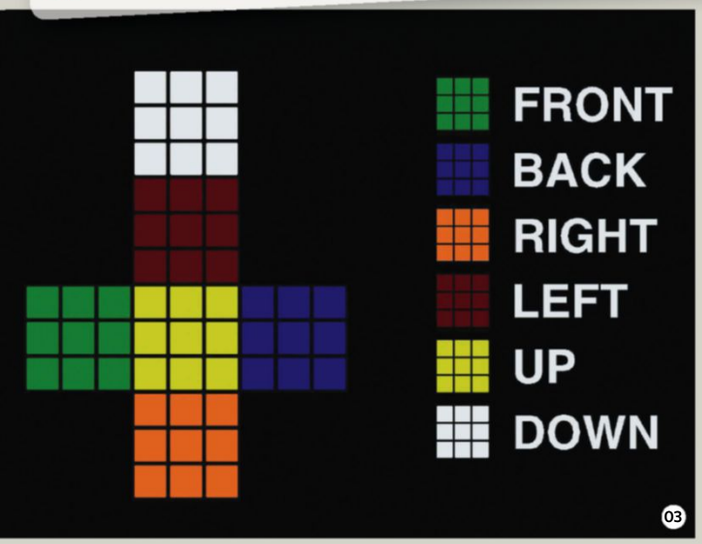
Let's start twisting...

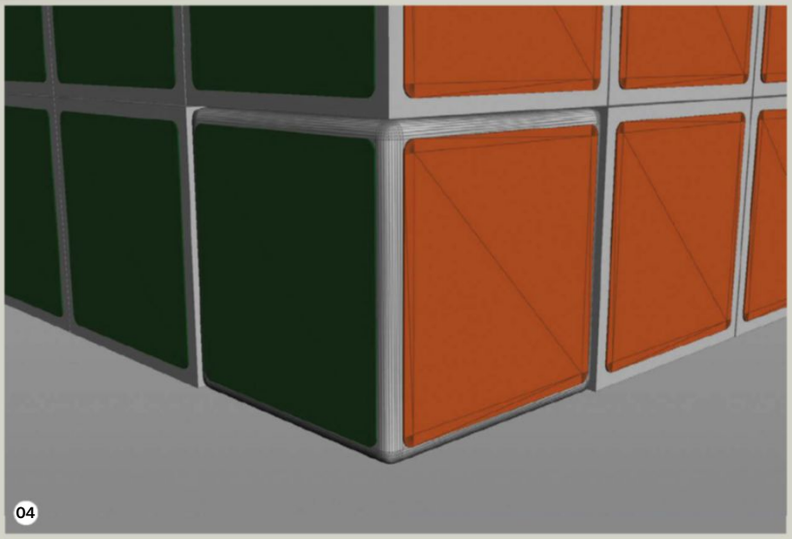
01 Model the basic shape

Open up the HIP file supplied and look around to familiarise yourself with it. Select the lores_cube geometry container and hit Enter to jump into it. As you can see, a box has been added and duplicated three times in all directions using the Duplicate SOP to create the cells. Make sure that the boxes never perfectly connect to one another, as there is always a little gap. To keep the shapes light for the animation, we won't add any detail to the cells at this level.

02 Add the stickers

Initially build the rounded edges by creating arcs with a lot of points by using the Circle SOP. Connect the four 90-degree arcs using the Add SOP to create a flat shape of a sticker, then, using the PolyExtrude SOP, you can apply a slight thickness to it. Duplicate this twice, then this set of three twice more with the Duplicate SOP, to get nine stickers for one face of the cube. Next copy this setup and transform it five more times to get stickers on all the faces of the cube. Now just apply the right RGB values to match the colours from the original 1980 Rubik's Cube. You can also assign UVs to the stickers on all the individual faces to be able to project images on them, as some Rubik's Cubes were sold with separate images on every face instead of colours.





03 Establish the layout

Each face of the Cube gets assigned a letter, F (front), B (back), R (right), L (left), U (up) and D (down), as you can see on the screenshot. This is very important for the solver, as each step is made up of a sequence of twists (a one-quarter turn of the face of the Cube). To complete the sequence for each step, one face gets twisted, then another and so on for the complete sequence. You can also introduce the letter 'I' notation for inverse or counter-clockwise rotation. Now, using this language, we can easily decode a series of moves by simply describing it as 'F Ri L Ui D D Bi', for example. It's a good idea to spend time familiarising yourself with this language, as it will crop up again later.

04 Bring detail to the cells

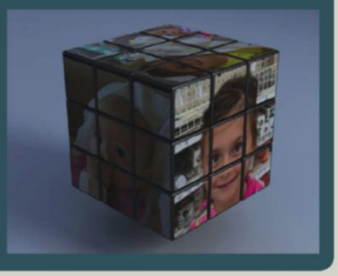
Now select the cube__RENDER Geometry container and hit Enter to jump into it. As you can see, you can access the animated cells of the cube, but at the moment they are just low-resolution boxes, not too practical for rendering purposes. Separate the cells using the previously created groups on a Delete SOP and apply bevel to them with the PolyBevel SOP. Now all the cells have the necessary detail for rendering but it hasn't carried through the whole process to slow down the animation.

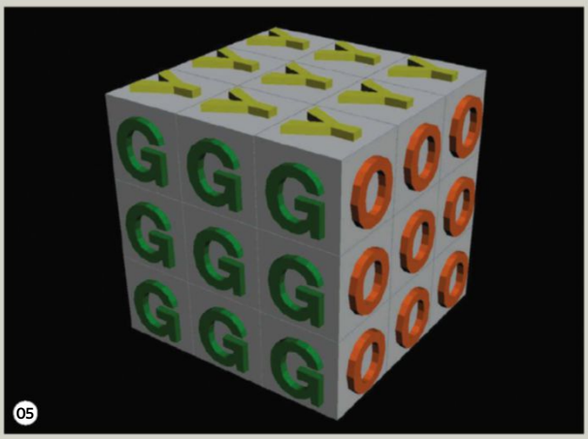
05 Set up the solver

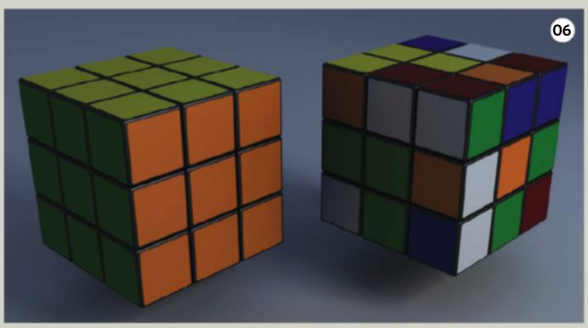
The solver uses the scrambled Cube as its initial data set, but it has to be able to identify the configuration of the colours on the faces. For this, at the modelling stage of the boxes, store the colour of that side of the box as a string attribute on the primitive level. Then, when the solver processes the initial state of the cube, it will loop through the cells in a specific order and read the colour codes from the sides.

Use your own images on the Cube in place of colours

As mentioned in Step 2, some Rubik's Cubes were sold with images on the faces instead of colours. When I built the stickers, I applied UVs to the faces using an orthogonal projection and I added the option to be able to assign one image to every face of the cube using the UV Quick Shade SOP. This way every image gets projected to a grid of 3 x 3 stickers representing one face and as the cube gets scrambled the images get mixed up as well.





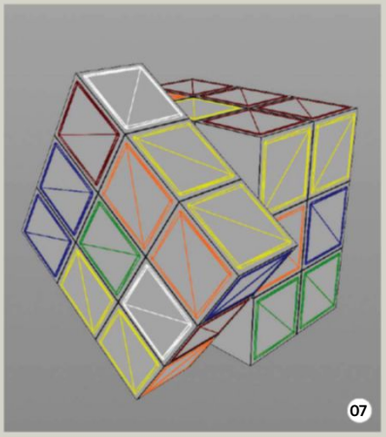


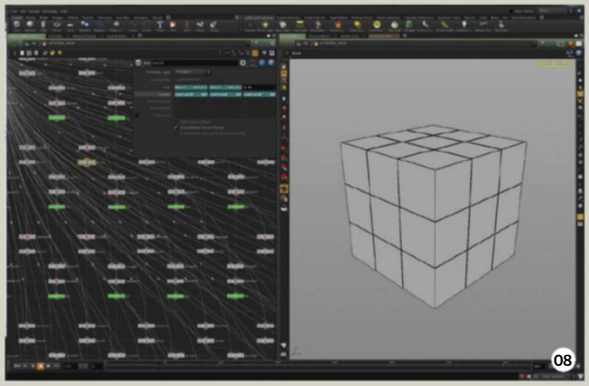
06 Scramble the Cube

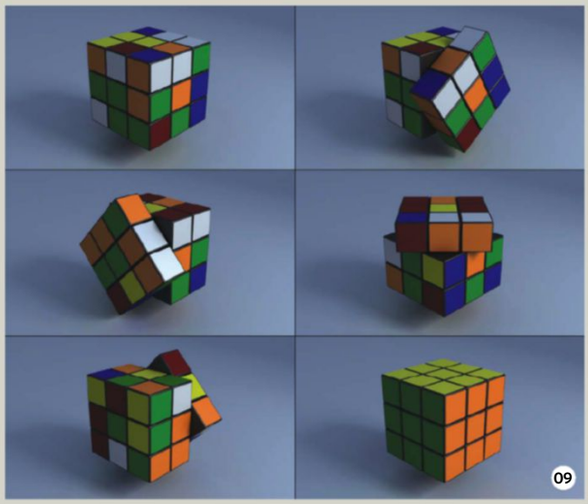
For solving the Cube from a scrambled state, first you need to create a tool to scramble it from its original state. Select the scramble geometry container and hit Enter to jump into it. Here you'll find a chain of identical operators connected to one another. Each operator is handling a single operation applied to the current state of the Cube. The operation is defined by the same notation explained in Step 3.

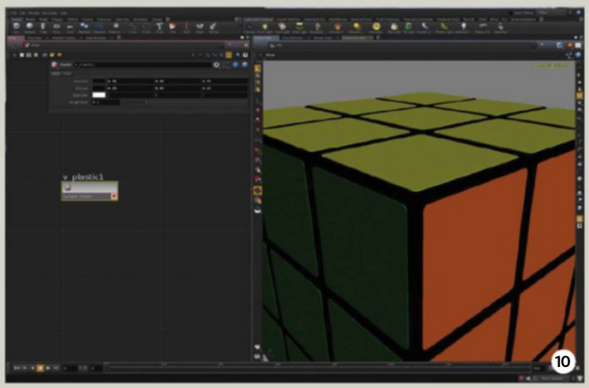
07 Begin animating

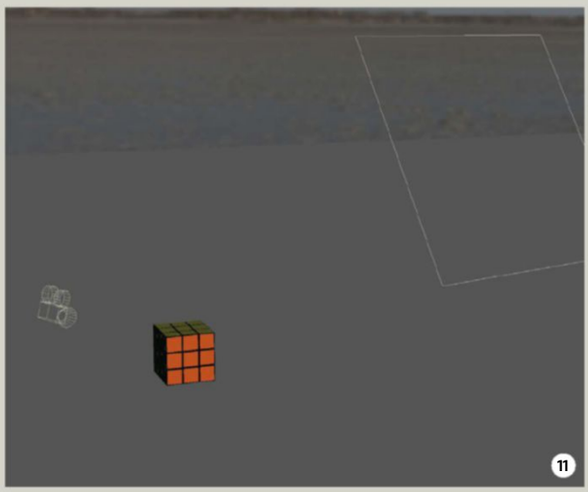
On the operator you can also specify how long the operation should take in frames. Connecting operators to one another will result in an animation where every step is well defined by a single operator, applying a single step on top of the result of the previous one. For example, if we connect four operators to one another and they all have a length of 12 frames – and the operations are U Di F L – the result will be a two-second-long animation (48 frames), where the original Cube will be scrambled by rotating the Up by 90-degrees clockwise, then Down by 90-degrees counter-clockwise and so on.











Writing the solver

Solving the Rubik's Cube is a very complex problem and the subject has an extensive, well-documented history. There are numerous algorithms out there and most of them require serious mathematics to be understood. The latest and most successful algorithms are based on group theory and by using supercomputers it was shown that all Cube positions can be solved by no more than 20 face turns. The key for implementing a solver is to find an algorithm that's not too hard to implement but good enough to give a solution with an acceptable number of steps. There are many solvers available with full source code in Python, only the IO layer needs to be added to send the data to it and get the solved data from it.

08 Gather data for the solver

Now that there's a Cube in a scrambled state, the solver needs to know a description of it so it can solve it. In Step 5 it was explained that every outer face of the 26 boxes has a primitive-level attribute storing its original colour. After scrambling, you just need to iterate over on the faces from top-left to bottom-right and get the colour from the primitive attribute. Next, pass this to the solver in the order the algorithm expects it. Select the Solve Geometry container and hit Enter to jump into it. Inside there is a network where you can perform a bounding box-based group selection for every face and only keep the face you're interested in.

09 Use the solver

After passing the initial information to the solver, the algorithm will run and output a series of steps using the same notation explained in Step 3. Then there's another operator, which loops over the steps and applies them to the output of the previous step. The length of a step is specified in frames the same way as in Step 7. The resulting animation is the output, which can be rendered to show the solving process.

10 Apply the material

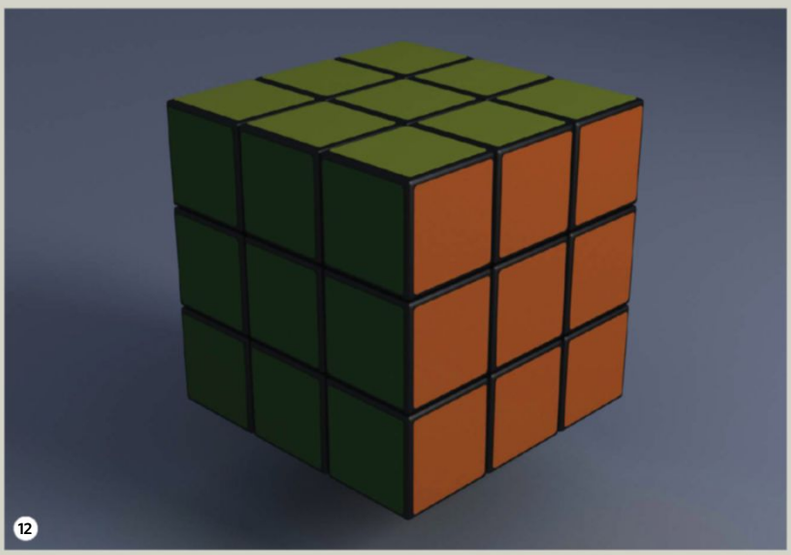
Since the Rubik's Cube was originally made of plastic, to make it look completely realistic in the renders you can use Houdini's Plastic shader. Add a little bit of white to the Ambient and Diffuse colours and set the Specular to 100% white. To get the right look around the bevelled corners, set the Roughness to 0.2.

11 Set up the lighting

To achieve realistic lighting, it's usually a good idea to use HDRI lighting. Create an Environment Light using one of Houdini's sky images for an Environment map. Now you just need a key light for generating the nice specular hits on the bevelled edges and to create shadows. For this, make a Grid light and set the Intensity to 9.0. Set the Attenuation on the key light to Physically Correct for realistic lighting.

12 Render out the Cube

To achieve the greatest level of photorealism, use Mantra's physically based rendering model for rendering. Here the defaults have been used for most of the settings, except Pixel Samples and Noise Level. The Pixel Samples setting dictates the number of samples, which are filtered to get the colour for a pixel. The Noise Level was set to Ray Variance Antialiasing, as using the default value can generate very noisy images. These parameters improve the quality of the render greatly, but also slow down the render dramatically. Use 6 x 6 for Pixel Samples and 0.03 for the Noise Level to avoid artefacts.



3DArtist

Back to basics

In part two of his environment project, Jahirul Amin shows how you can add tones and textures

The final result of the texturing and shading work

With the Disc

Tutorial files:

- A Maya project directory ('project_environment') including scene files, textures, HDRIs and reference images

Texture an exterior environment in Maya

"3D brushes and paint pots at the ready: here we'll cover a linear workflow, setting up a look-dev environment, UV unwrapping, plus texturing and shading"

Here we're going to add shaders, as well as UV-mapped and procedural textures to the environment we modelled in the previous issue. The following ten steps will guide you through unwrapping UVs, setting up a linear workflow, creating an environment to test shaders and textures, then finally how to use a shader.

To maintain consistency between our shaders, we'll make a look-development environment, taking all our assets into this space, then testing the shaders and texture maps there before dropping them back into the main scene. For this environment, we will be using area lights with the Decay Rate set to Quadratic, as this will create a more physically correct light source. For the ambient lighting we'll use an HDR image. HDRI Hub (www.hdri-hub.com) has kindly supplied a range of images so we can test our assets under a number of lighting conditions. Be sure to check out the website, as there's a lot of useful stuff that you can pick up for free.

To get all the lighting to behave in a believable manner within the look-dev scene, we'll be implementing a linear workflow. If you're hoping to take your images into a compositing package, such as NUKE, working linearly just makes all the maths work correctly. Though it may fry your brain, it can also become your best friend for life. Just note that there are many ways to approach a linear workflow in Maya, such as plugging a mia_exposure_photographic/simple node into the Camera Lens setting, or simply managing colour in the Render Settings. One of the important choices when setting up this workflow is keeping full control, as opposed to Maya making any decisions, which is especially

key when it comes to gamma-correcting any images. This may be time-consuming, but it's time well spent.

As the camera is locked off, we can also go in and start optimising our main scene before shading and texturing the assets, which will be advantageous in two ways. First, by getting rid of any objects that are not seen by the frustum of the camera, we can speed up render time. Next, we'll only need to shade and texture those objects that haven't been deleted. If you can't see it, don't spend any time on it. All this will create a lighter, more manageable scene.

Once it's cleaned up, we can start exporting out each house, castle and so on, to bring them into a clean scene to unwrap UVs where needed. As we are mainly dealing with glorified cubes, we should be able to use Maya's default UV-unwrapping tools. Primarily we'll be using the Planar Mapping tool, or the Automatic Mapping tool, then going into the UV Editor window and stitching the UVs together to give us as few UV islands as possible.

You'll find that many of the objects are also just modified duplicates, such as the floor bricks and the roof tiles. As these duplicates have the same vertex count, we can UV a single brick and then copy those UVs over to every other brick. Sadly, using Maya's Mesh>Transfer tool will only enable you to copy from a single object to another object. Having to do this one brick at a time will drive any sane person mad, so thankfully Oleg Alexander has created a neat little MEL script called oa Multi UV Transfer 1.0.0.mel (download free from www.creativecrash.com). This script enables you to copy the UVs over to multiple selected objects.

The most important factor when unwrapping models is that the 2D representation in the UV Texture Editor looks very much like the 3D object. By this I mean that the spacing between the edges in 2D is similar to that in 3D. This will help reduce textures stretching or compressing, which can look pretty horrible and ruin an image. This doesn't need to be perfect, as we won't get up close to our assets, but it does have to be competent. We can use a simple chequerboard to assess the integrity of our UVs.

There are many objects within our scene, so to unwrap and then texture every one would be a very time-consuming process. This means for many of the objects, such as the roof tiles, we'll have to create procedural textures. It's amazing what can be done by simply plugging some Cloud or Noise nodes into the Color and Bump channel of a shader. The objects that will need to be hand-textured, primarily the main body of each building and the wooden beams, can then be taken into a 3D painting program as an OBJ file. I will be using MARI here, but anything like Mudbox or BodyPaint will be fine, or you can stick to a 2D package such as Photoshop if you prefer. If you're taking your UVs straight from Maya to a 2D package, you'll need to create a UV snapshot from the UV Texture Editor.

For the textures, I've grabbed some of the amazing reference from CG Textures (www.cgtextures.com) to project onto the geometry. I'm not going for a photoreal look here, but using images of the real world and manipulating them will add a heightened sense of believability when working against the procedural textures. Once the Color map has been created (this will also be the foundation for the Bump and Roughness maps if needed), we'll take everything back into the look-dev scene.

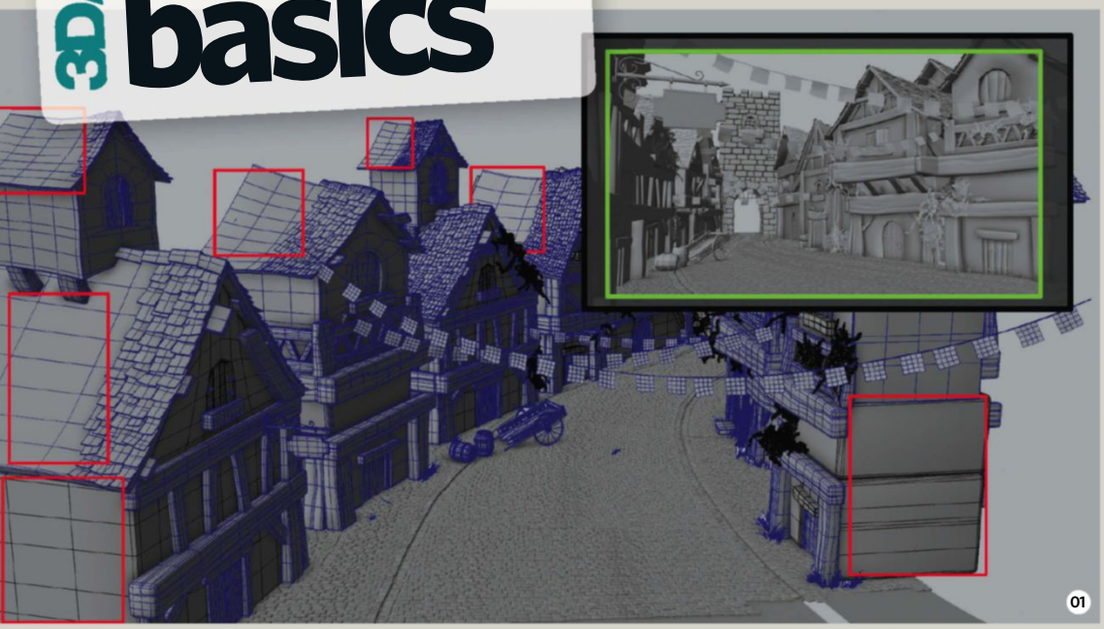
From here, it's a case of setting up our shaders and then there will be some back-and-forth to refine the maps between Maya, MARI and Photoshop. We'll create the maps at a 4,000 resolution (4,096 x 4,096), which is pretty large. This is because we can always make them smaller and get good results, as opposed to making smaller texture files larger. This enables us to pop higher-resolution maps on objects that are closer to the camera, then use the smaller maps for objects further away. You may find that some of the objects don't need any texture maps, as they are so far away from the camera, making a coloured shader sufficient.

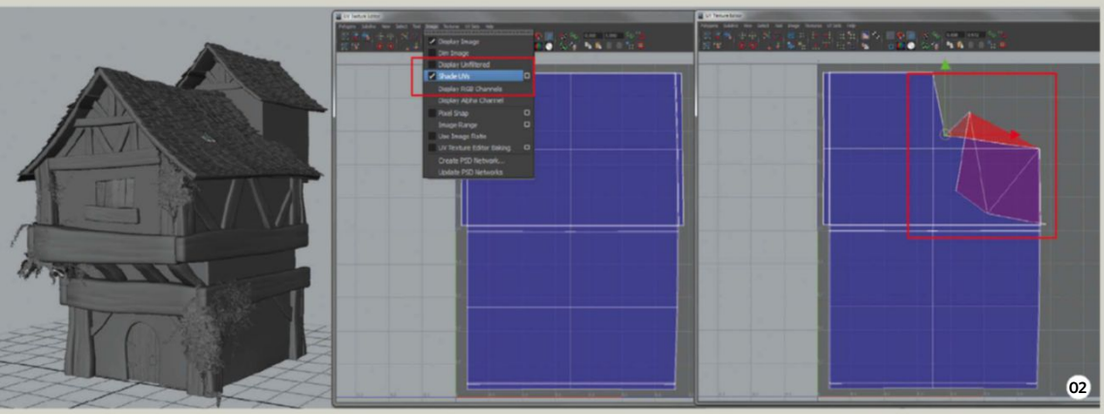
As we are creating a look-dev environment that's designed to be physically accurate in terms of its lighting setup, it makes sense to also use shaders that fall into this category. The mia_material_x will therefore will be our shader of choice. It's a monolithic shader that's been designed to handle most architectural materials such as wood, glass and metal, as well as being an energy-conserving material. The shader also comes with a range of presets, which can be a great platform to further refine from. Once we have some hero shaders that have been procedurally created, we can duplicate them, then tinker with the Color and Bump channels to add variation throughout the scene.

A variation of HDR images to check the integrity of the shaders being used

The environment as we left it in the last issue

Back to basics


01


02

Too many objects, not enough time

You may find you have so many objects and not enough time to give them enough attention. In this case you can start merging some of the objects together to produce larger chunks. For example, most of the houses are comprised of three body parts. This would result in needing three different shaders and three different maps for the Color, Bump and Spec. Instead, you can just combine the three parts of geo together by going to Mesh>Combine, organising the UVs so there's no overlap and then exporting out that combined object for texture painting.

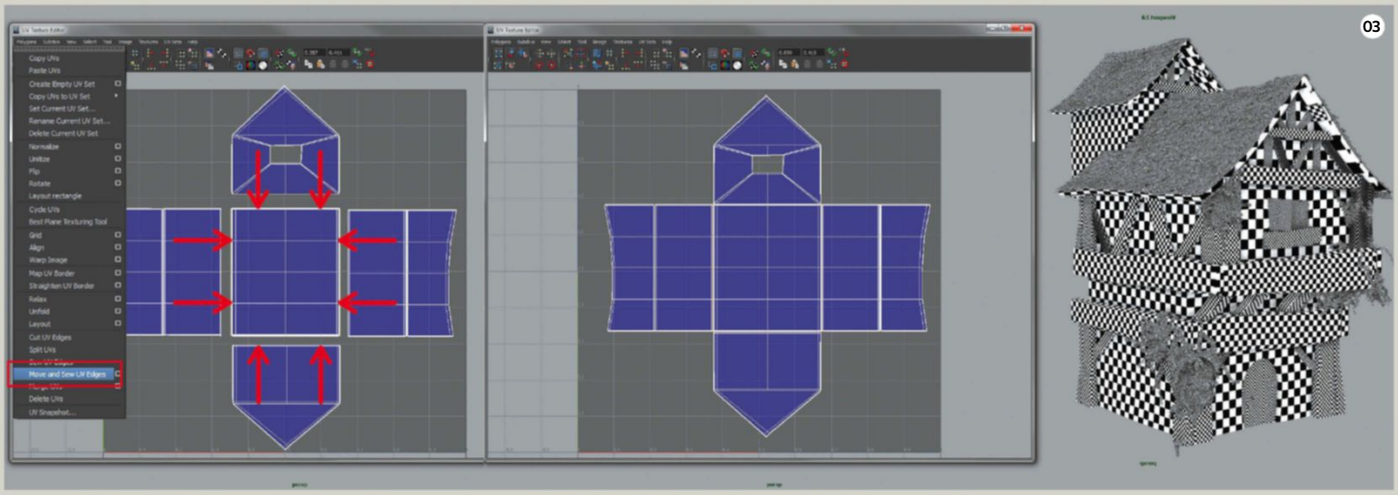
Plan your work...

01 Optimise the scene

First open up the final scene from last issue, '00_final_modelling' (provided this issue), and start by getting rid of any objects that can't be seen by the perspective camera (this will be our render camera). We're deleting them here, but you can always just hide those objects if you think they may come in handy later on. Next, break up the scene file by selecting the top group for each asset in the Outliner and going to File>Export. Save the group as an MA file, open up the first of those assets (starting with 'houseA.ma') and start thinking about what will need to be manually textured and what can be taken care of procedurally. As we want to add cracks to the walls, we'll definitely be UV unwrapping the main body parts for each house and also the roof tiles. Although you may be thinking you'll procedurally handle the roof tiles, they shouldn't take long to unwrap and you can simply use the oa Multi UV Transfer 1.0.0.mel script to copy the UVs across. At least this will provide you with some flexibility as you proceed.

02 Unwrap the UVs

Select the first of the body parts for the house and go to Modify>Freeze Transformations. This will zero out the Transform and Rotate channels, as well as give us a uniform value of 1 for Scale. When using some of the UV Projection tools, you can get skewed results if you have values in the Transformation channels. With that done, select the geometry and go to Create UV>Automatic Mapping. Next, go to Window>UV Texture Editor and let's start sewing this back together so we have as few UV islands as possible. Before doing so, go to Image>Shade UVs, which will help reveal any overlapping UVs by going from the blue (what we want) to a purple. Any red UVs will mean that they are inverted and will need to be flipped back to blue.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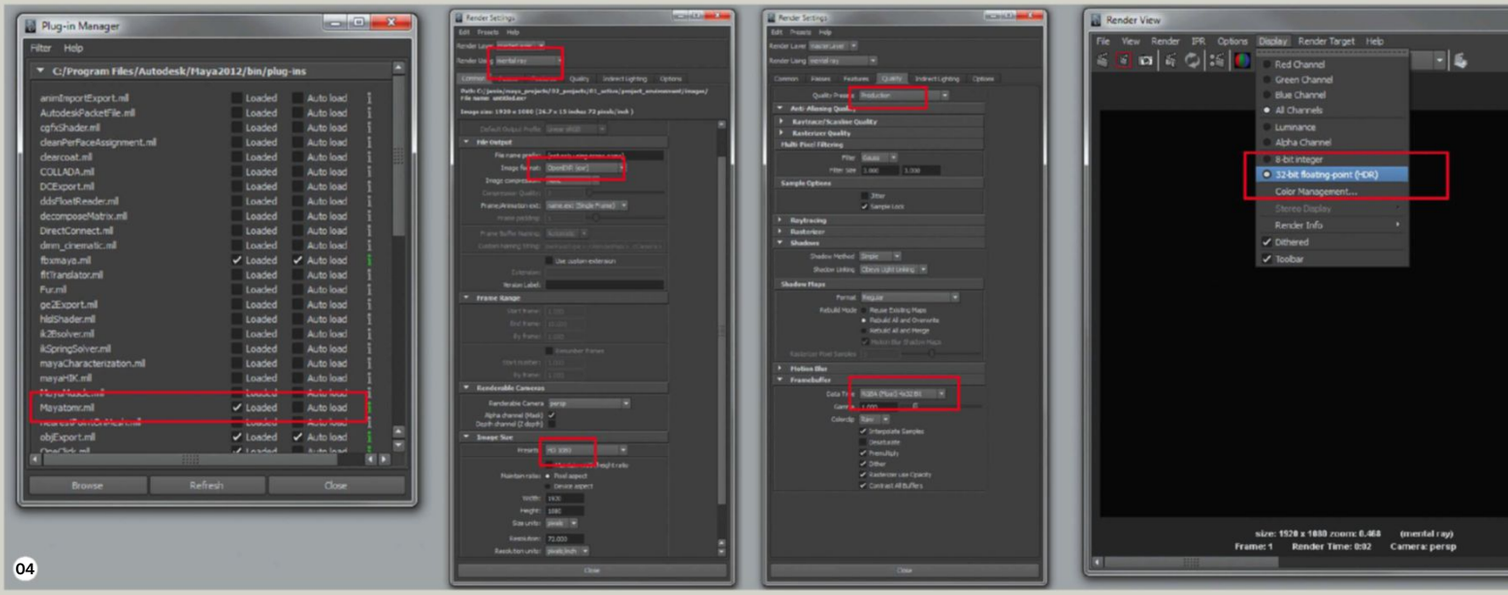


03 Clean up and re-check the UVs

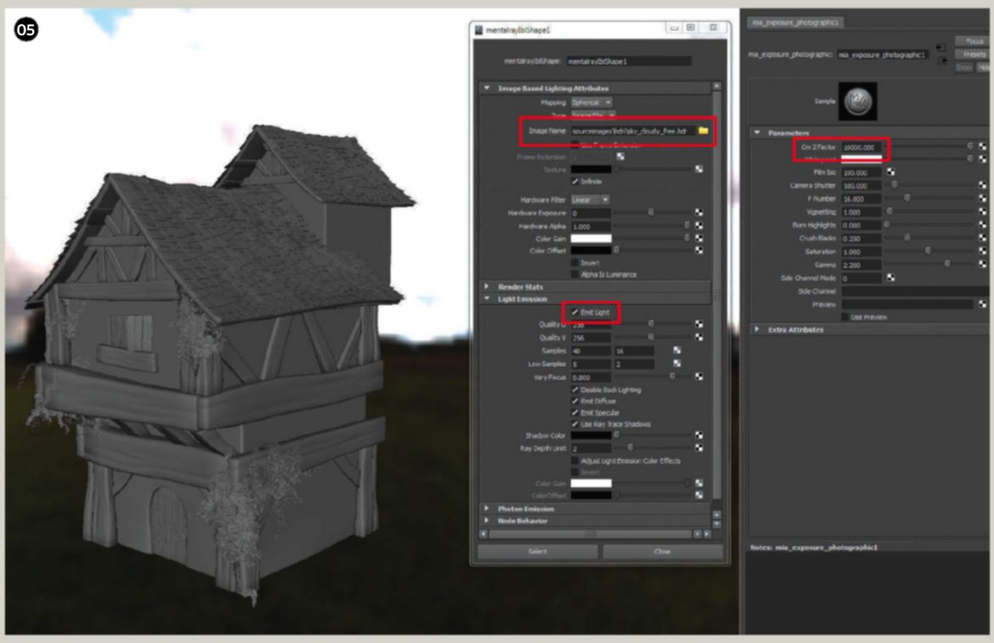
Next select a row of edges along one of the islands and go to Polygons>Move and Sew UV Edges. This should start bringing the individual islands together without too much distortion. Continue to do this until you have pretty much a single UV island (you may have the odd loose bits). Next, grab all the UVs and scale them so they fit snugly into the UV quadrant. Don't scale this randomly on one axis, as this will cause distortion. Remember, we want to keep our 2D representation as close to its 3D counterpart as possible. Next, apply a new Lambert material to the object and plug a Checker node into the Color channel. Hit 6 on the keyboard to go into Textured mode and find the place2dTexture1 node that should have been created. If you can't find it, go into the Utilities tab within the Hypershade window, select it and increase the Repeat UV to be 20 and 20. If this looks blurry in the viewport, you will need to update it by scrolling down to Hardware Texturing, found in the Lambert Materials Attribute window, and setting the Texture Resolution to Highest (256 x 256). Instead of doing this, you can also just change the Viewport Renderer to be in High Quality Rendering or Viewport 2.0 mode. When happy, you can then export out the elements that will need texturing.

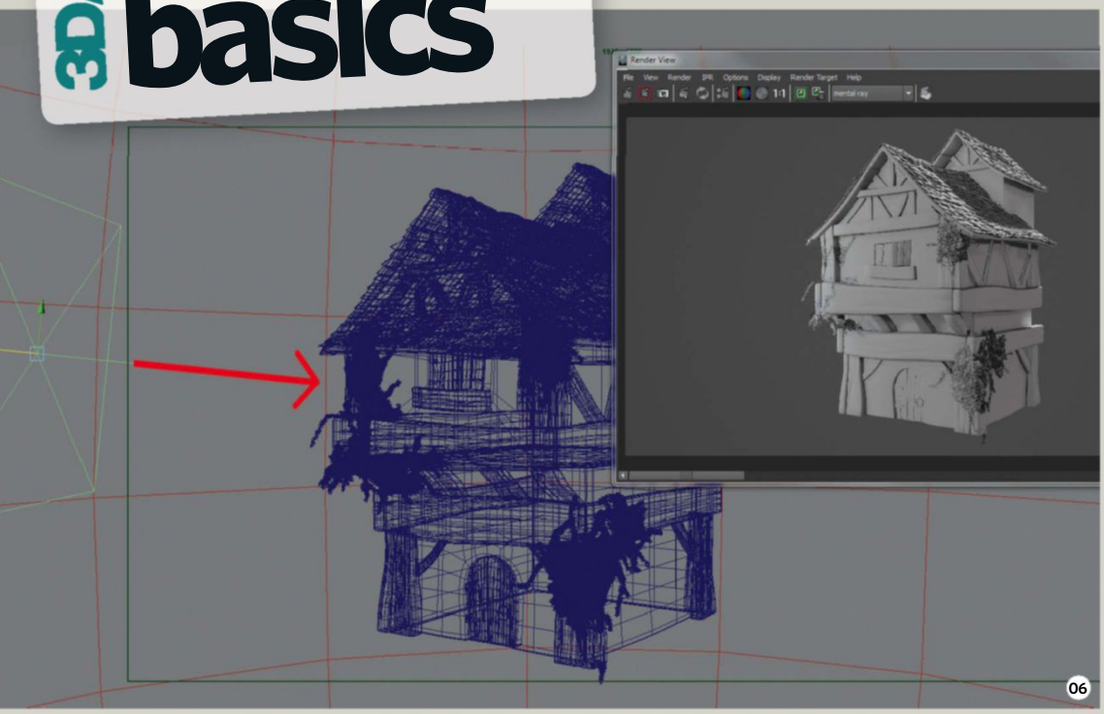
04 Set up mental ray

With the unwrapping complete, we can start setting up our look-dev environment. First we need to make sure mental ray is installed. Go to Windows>Settings/Preferences>Plug-in Manager and ensure Mayatomr is loaded. Set this as the renderer by going to Window>Rendering Editors>Render Settings and changing the Render Using to mental ray. In the Common tab, switch the File Output Image format to OpenEXR (exr) and the Image Size to HD 1,080. Pop into the Quality tab, select Production for the Quality, scroll down to the Framebuffer and edit the Data Type to RGBA (Float) 4x32 Bit. Next, open up the Render View window and go to Display>32-bit floating-point (HDR). You may be told that Maya will update this setting the next time it loads up. If so, save your scene file, close Maya down and reopen it.

05 Add the HDRI and lens shader

Open up the Render Settings, scroll down to Render Options in the Common tab and uncheck Enable Default Light. Scroll over to the Indirect Lighting tab and click the Create button for Image Based Lighting. When the mentalrayIblShape1 attribute window appears, pick one of the provided HDRI files or any from your own collection and plug it into the Image Name attribute. Here we're going for 'sky_cloudy_free.hdr' as this gives an even amount of ambient light without being too harsh. Still in that window, select Disable Primary Visibility under Render Stats and enable Emit Light under Light Emission. Back in the Render Settings, just make sure that Final Gathering has also been enabled in the Indirect Lighting tab. Last, select the Perspective camera and go to the Attribute Editor. Scroll down to the mental ray tab and click on the input for Lens Shader. When the Create RenderNode window pops up, under Lenses, select mia_exposure_photographic. You will probably need to crank the Cm 2 Factor to something like 10,000 to bring out the image. Please note that the current Gamma is set to 2.2, which will give us a correct image in our Render View. When it comes to rendering the final EXR file, take this down to 1 and this will work correctly in a comp package.





06

Turntables with HDRI

If you're looking to do a turntable render by animating the HDRI, you will probably find that everything looks good in the Render Settings window, but when you use the Batch Render, the HDRI doesn't actually rotate, which is annoying. To counter this, I prefer to simply select all the geometry and the render cam (in this case, the perspective) and group them together by hitting Cmd/Ctrl+G. Now simply animate that group 360 degrees and hit Render.

06 Use area lights to gain extra coverage

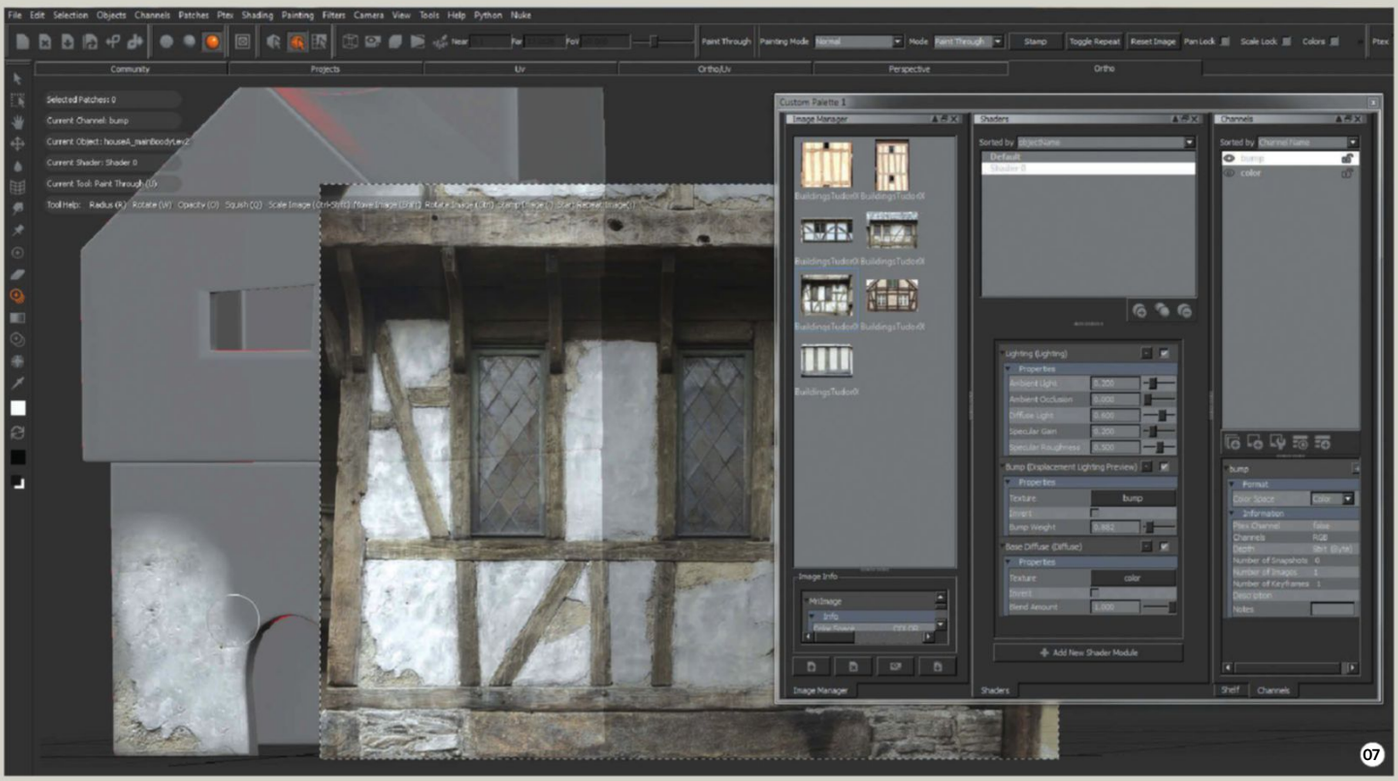
The HDRI with the Emit Light attribute turned on is giving a pretty strong key light, so we can add one extra area light to act as a fill source coming from the opposite direction of the key light source. Go to Create>Light>Area Light and when it's done, scale it up to be much larger. Here the light is positioned coming from the screen's left when looking at the house from the front. With the light selected, you can go to Panels>Look Through Selected, to make positioning a bit easier. Make sure to change its Decay Rate to Quadratic and increase the Intensity to something between 500 and 1,000. Scroll down to the mental ray tab and check Use Light Shape and Visible. If the render is grainy, we can come in here and increase the High Samples to something like 32. Bear in mind that this setting could have a big impact on render time.

07 Use texture-projection methods in MARI

So we've set up our UVs where needed and created a look-dev environment. Finally, we can start texturing. We'll take the OBJs that need painting into MARI and from there use Projection Brush to project through an image. Using the texture library from CG Textures, you'll find a range of images for Tudor houses, which acts as a great base. You'll should find cracks, colour variation and some good old wear and tear. Use a soft brush with a low opacity and build up the texture while projecting through. This method enables you to minimise the patchiness that can occur when combining several different images together.

08 Create and apply the mia_material_x

Once the Color map has been created, duplicate this channel, rename it 'Bump'



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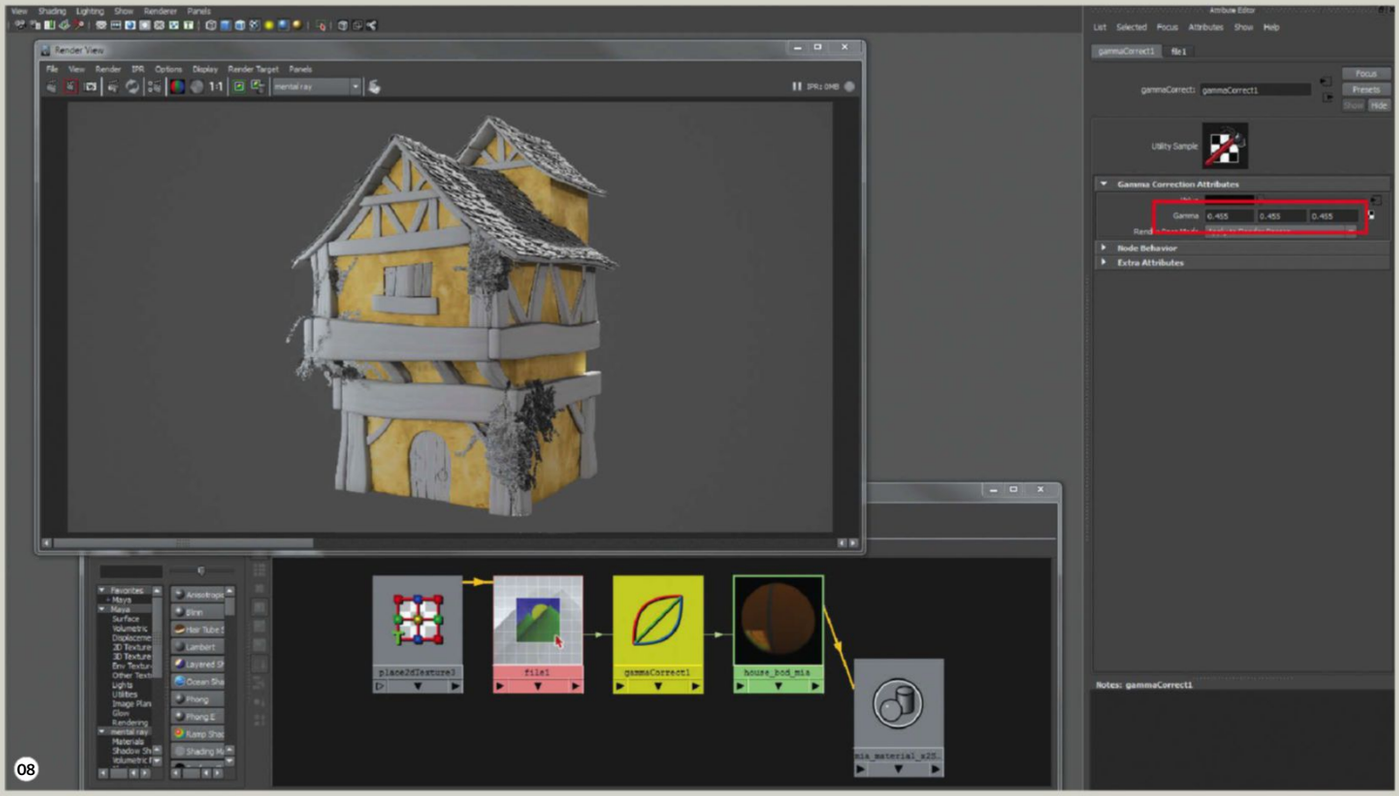
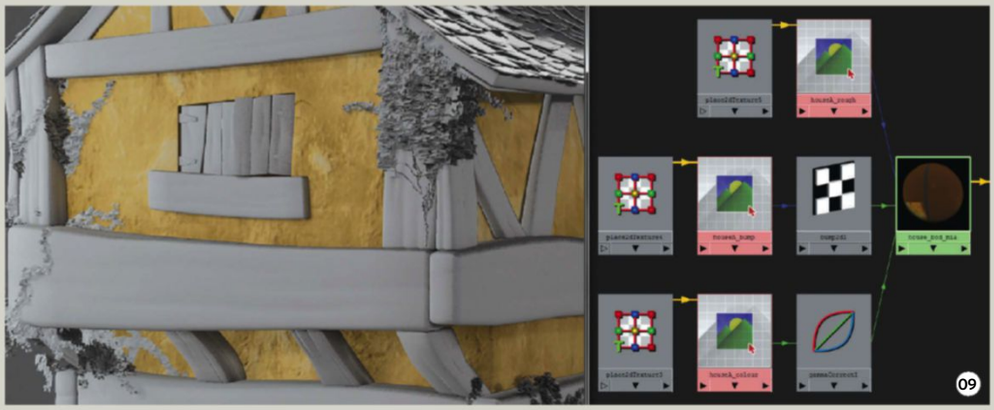


and then desaturate it to take out the colour. Create a new shader and add a Bump Shader Module to start combining the different channels together. The Specular maps will also come from the Color map, so when all three are done we can export them out as TIFF files. Go back into Maya, open up the latest look-dev scene and, in the Hypershade menu, go to Create>mental ray Materials>Mia_material_x. Open up the Attribute Editor and edit the preset to Matte Finish. For all our Color maps (including coloured shaders), we'll need to add a Gamma Correction node. Click on the Input icon for the Color node to open up the Create Render Node window and, under Utilities, create a Gamma Correct node. Edit the Gamma to 0.455, 0.455, 0.455 and then click the Input icon for the Value. Create a File node and plug your colour texture into the Image Name.

09 Add the Bump and Spec

Now plug the Bump map into the Standard Bump on the mia shader and the Specular map into the Roughness attribute. It's then just a case of tweaking the settings and doing some render tests. Try taking all the maps into Photoshop so you can play with the Hue, Saturation and Contrast settings. Run a High Pass filter through the Bump map. Once this shader is done for the body of the house, we can reuse it for the rest of the houses by simply changing the Color, Bump and Spec maps and also adjusting the attributes so they aren't carbon copies.



10 Make procedural shaders

For the roof tiles and floor bricks, here we're going with procedural textures. For all these shaders, use the mia_material_x and again starting with a preset push them further. For the Color map, first add the Gamma Correct node and plug a Noise, Cloud or Fractal node into the value of the Gamma node. By playing with the attributes of each node, you can get some great results. You can plug in extra nodes within them, such as a Ramp, to add further variation. Once you have the Color map finished, do the same steps for the Bump channel, excluding the Gamma Correct node. Once done, pop all the assets back into the main scene, ready to light and render.

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> It's always useful to create custom brushes in ZBrush that can help speed up work. Good brushes are things such as screws, nuts, fans and so on

Libertaria-027 High 2013

I wanted to create this image so I could work on a character with hard surfaces. I tried to imagine a character with sci-fi armour, but still reminiscent of the world of fantasy that I love. *Libertaria* was the result of these two worlds coming together!

I made this...

Incredible 3D artists take us behind their artwork

Artist info

Daniel Orive Gomez

Website www.danielorive.com
Country Spain
Software used ZBrush, KeyShot
Bio Daniel has worked for several years as a concept artist, but recently started a career in 3D as a character and environment artist

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iClone
Alan Marques
www.alanmarques.com

Alan Marques is a UK-based freelance VFX supervisor and digital artist working across film, television and documentary projects using a range of digital tools

CINEMA 4D
Tim Clapham
www.luxx.tv

Tim Clapham is a motion graphics director for Sydney-based Luxx. Known for sharing tips, he also heads up the community training portal helloluxx

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PLUS iClone4 PRO

iClone

Technical pre-vis for VFX

"Can iClone be used as a pre-vis tool to prove a VFX concept before shooting on-set for real?"

Pre-vis is the mainstay of any VFX-based production. As a VFX supervisor, you get asked to solve all kinds of problems, so rather than turn up and wing it, pre-vis enables you to try out and prove an idea first.

There are two main types of pre-vis: narrative and technical, but we'll use the latter to prove this concept. Pre-vis needs to be executed as rapidly and cheaply as possible. If it involves characters and actors, then the last thing you want is to be bogged down in a major 3D application.

iClone is a tool that uses real-time game engine technology to enable users to create their own machinima movies and, in our case, this is ideal as a pre-vis tool.

On a BBC series called *Outcasts* one of the series directors wanted to do a moving doppelganger shot, where the same actor appears in a scene talking to himself. Normally this requires a costly motion-control camera so that the camera move can be repeated exactly on-set. However, I was able to use iClone to show a manual method that could be achieved on-set with a circular dolly track, crew and grips.

iClone is not a 3D-modelling application, so if you need to bring in bespoke 3D assets, they will have to be created in a 3D-modelling package and brought into iClone using its sister program 3DXchange. Here you'll find a pre-created asset of the actual apartment set where we filmed the sequence made from on-set measurements and photographs.

With the apartment set in iClone, we can add a virtual path to represent our circular camera track and add both a camera and a greenscreen flat to this. We'll then take one of the stock iClone actors from the library and add two copies into the scene to represent our doppelganger. The characters will be animated using iClone's puppeteering tools and a camera move around our circular track will be performed to capture the action.

Finally we will render out two takes, one for each of our actor's positions, and use a compositing package to composite the greenscreen pass with the master shot, just as we will plan to do for the live-action shoot.

growing community at www.3dartistonline.com

Blender

Filippo Veniero
www.ifilgood.it

A freelance artist and lover of all things open-source, Filippo likes to emphasise simple objects, focusing on details, ambience and lights for very realistic results

NUKEX

Dave Scotland
www.cgswot.com

With over 12 years of CG production knowledge and experience, Dave has worked for some of the biggest clients, such as Disney, Warner Bros and Plastic Wax

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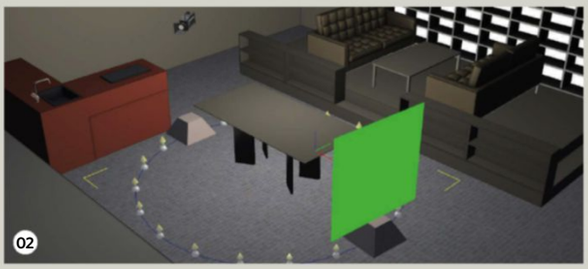
01 Set up the scene

In the Content Manager, create a new folder for this project called '3Dartist Previs'. Open this folder in Explorer using the Find File feature and copy the supplied project file, 'PV Apartment.iProject', into it. Load the apartment project file into iClone, then create a circular dolly track for the virtual camera. Under Animation> Path>Template add the pre-defined Circle01 to the scene and rename it 'Dolly Track'. By default the path will be floating in the air, so to mimic a real camera track we want to drop it to the ground. In the Command panel, enter 0 into the Z Transform field.

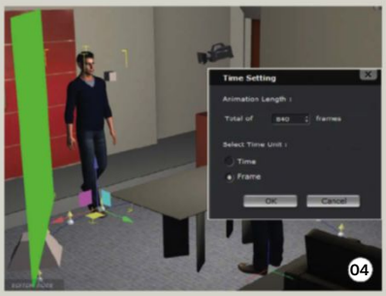


02 Add the greenscreen and camera

Centre and scale the dolly track around the table on the main floor. We need two virtual dollies, so add two copies of Box004 from Props>Template>3D Blocks to the scene and scale by 50%. Name one 'Camera Dolly' and the other 'GS Dolly'. Use the Pick Path button in the Command panel to position each one on opposite sides of the track. Make sure that Follow Path is ticked and the Follow Axis is set to Y for both props. Add a new camera called 'Cam Previs', position it directly above the Camera Dolly prop and Link it. Now add a Box_002, call it 'Greenscreen', position, scale and link it to GS Dolly. Give this a 100% luminous-green material.

03 Insert the actors

Now add two copies of G5 Chuck from the Template library, renamed 'Chuck001' and 'Chuck002'. The first will be positioned by the coffee table as seen in the accompanying image and the second should be over by the entrance door looking into the room. Add a Box_001 prop to the scene, scale it to 10% and set it as a Dummy. Rename it 'Cam Lookat' and place it near the door at chest height in relation to 'Chuck002'. Now set Cam Previs to Lookat this target.



04 Begin animating your virtual actors

Set the length of the animation timeline to 840 frames and Display as Frames. iClone operates at 60fps, so 840 frames will give us a 14-second shot. Select Chuck001, open the Motion Puppet panel and add a natural idle motion for the entire 14-second shot. Select Chuck002 and apply a basic walk cycle for three seconds. Next, with the Playhead at three seconds, record an idle motion until the end of the shot. Move the Playhead back to three seconds and use the Transform gizmo to position Chuck002 just in front of the table.

05 Move the camera

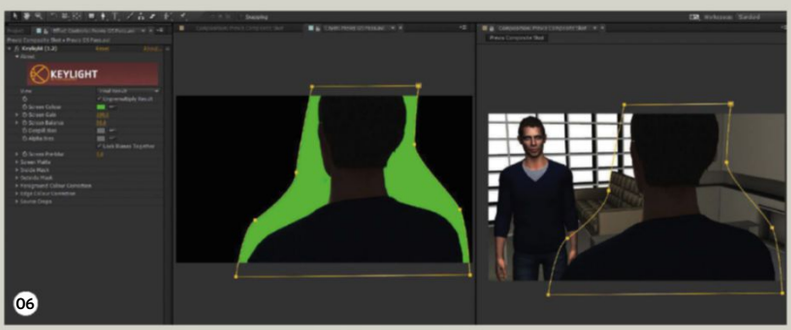
Open another real-time Preview window and change the Camera View to Cam Previs to reveal the final camera view as we animate. With the Playhead at three seconds, select Cam Lookat and use the Transform gizmo to slide it to the centre of the scene, so Chuck002 stays in the frame when looking through Cam Previs. Select Cam Dolly and type 80 into Path Position to move the camera to its end position. Animate Cam Lookat to produce an over-the-shoulder shot behind Chuck002.

06 Render and composite

Hide Chuck001, select the GS Dolly prop and animate the Path Position value so that the Greenscreen box is always behind Chuck002 as he walks to his end position. From the Export tab, render out the master pass with Chuck001 visible and the Greenscreen box hidden. Next render a Greenscreen pass with the Greenscreen box object and Chuck002 visible. Take these two rendered movies into your compositing package of choice and composite the Greenscreen box pass with some garbage matting over the master shot to make the final composite. This pre-vis has now proven that this technique will work on-set.

iClone 5 PRO tips

The Export tab controls the camera aspect ratio, so it's vital to set this when you start, because if you do it later it'll change the field of view of your camera and potentially create extra work reframing your shots. Set the Output Size to HD 720p (1,280 x 720). This sets the aspect ratio to 16:9, which is the format of this TV series. iClone auto-keys everything, so ensure you have your timeline Playhead at 0 to avoid objects from having unwanted animation when you position them.



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Inflate soft bodies in CINEMA 4D

"How can I quickly simulate a soft body object inflating?"

There are several ways that you could simulate an object filling with air in CINEMA 4D. One solution could be to model the deflated and inflated mesh as morph targets and then use the Pose Morph Tag to blend between these two states. The drawback with this approach is you need to manipulate your mesh to create both morph targets. In other words, you essentially need to model two objects with the same point count.

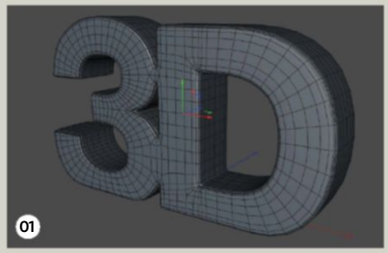
In this tutorial you'll learn a simple technique for inflating your objects using soft body dynamics. This approach is much less work-intensive than using morphs, as you only need to model the object once before inflation and dynamics will do the rest for you.

By using dynamics to model your blown-up object, you have the flexibility to alter the base mesh at any time and rerun the simulation. This means you can create a low-resolution object to test your theory and then go back later and add in extra detail such as wrinkles and creases.

As well as grasping the basic principles of working with soft body dynamics in CINEMA 4D, you'll also be shown how to use Vertex maps for an added layer of control over the dynamics simulation. By weighting the object's vertices, you can control the influence of the simulation at a vertex level. In this example you will use this technique to ensure the seams of the object remain stiff and help to maintain the overall shape.

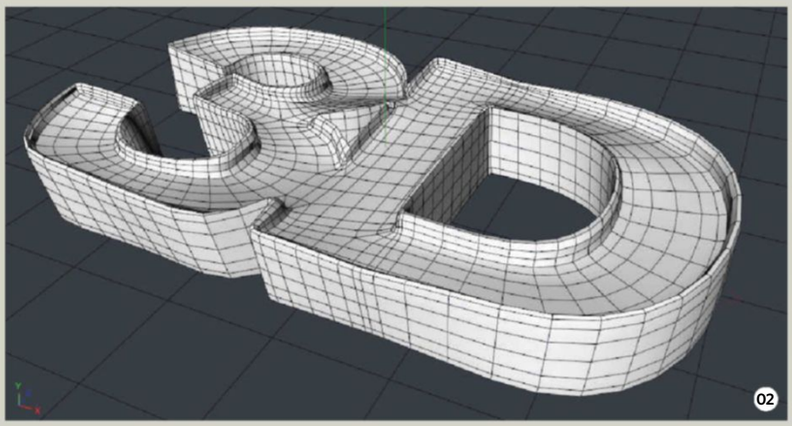
Dynamics can be fairly unpredictable, so you'll be learning exactly how to cache your result for speedy and consistent playback in the editor and reassurance that your scene will render correctly over a network. Once the dynamics have been baked, some camera animation can be added and the motion will be fine-tuned using CINEMA 4D's F-curve Manager.

Additionally, to celebrate the release of CINEMA 4D R15, you'll find a second bonus tutorial to complement this one. Once you've successfully completed these steps, visit www.helloluxx.com where Tim has posted a video in which he enhances this scene with shaders, lighting and rendering using some of the new features of R15, such as GI Light Mapping and working with Team Render.



01 Prepare your mesh

First of all you need to locate and open the starting project file called '3DArtist_BlowUp_Start.c4d' which you can find supplied with this issue's tutorial files. It's probably a good idea to copy this to a convenient location on your hard drive before opening the scene file. Once open, select the 3D Logo Polys object, hold down Opt/Alt and add a HyperNURB or Subdivision Surfaces object. The starting mesh is fairly low resolution, which will help speed up the dynamics simulation. Next, subdivide the geometry to create a smoother surface for rendering later. Now select the 3D Logo Polys object and navigate to Tags>Simulation Tags>Soft Body from the Object Manager menu.



02 Create a collision object

Press Play and the object will drop down due to gravity, so stop, rewind, then add a floor object to the scene. With the floor selected, choose from the Tags Menu>Simulation Tags>Collider Body. This adds a Dynamics Body Tag to the floor object and automatically sets the Dynamic parameter (under the Dynamic tab) to Off. The floor will not react to any forces such as gravity, but it will act as a collision object to any dynamic objects in the scene. On frame 0, move the logo up above the floor and press Play again. The logo will drop down, then hit and land on the floor.

03 Configure the dynamics

Select the Dynamics Tag on the floor and change Bounce to 90% under Collision. Select the Dynamics Tag on the 3D logo and set Bounce to 120% under the Collision tab. To stiffen the object, switch to the Soft Body tab under Shape Conservation and increase Stiffness to 100. Now the logo is too stiff and almost behaves as a rigid body. To create rigidity on only the seams of the object, drop the Vertex Map tag from the logo into the Map field for Stiffness. Now increase the Stiffness to 500. Where vertices are weighted at 100% they will be very stiff, but on vertices weighted 0% the Stiffness parameter will have no effect.

04 Inflate the soft body

To inflate the object, we can use the Pressure parameter that's found under the Soft Body tab of the Dynamics Tag. Rewind to frame 0 and then press Play. Once the object lands on the floor (usually at around frame 30) you can stop the playback. Set Pressure to 1 and add a keyframe by Cmd/Ctrl-clicking on the small animation dot. Move forward one frame, set Pressure to 50 and add another keyframe. Move forward a few more frames, set Pressure to 25 and add a keyframe. Now when you play the scene, the logo will hit the floor, then inflate and bounce up.

05 Bake the dynamics

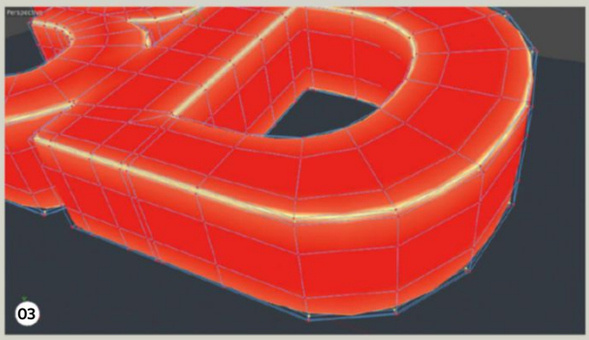
Once you're happy with the simulation it makes sense to bake the result. This enables you to scrub the timeline and playback will be much smoother. If you intend to render any dynamics simulation using a network rendering solution, then baking is essential. Select the Dynamics Tag on the logo, switch to the Cache tab and click Bake Object. After a few moments you'll see the icon on the Tag change to show it's baked and you'll find playback will now be much quicker. You can also bake all dynamic objects in your scene by navigating to Project Settings> Dynamics>Cache.

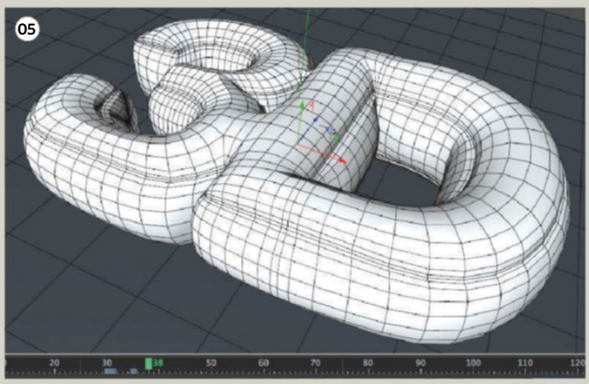
06 Animate a camera

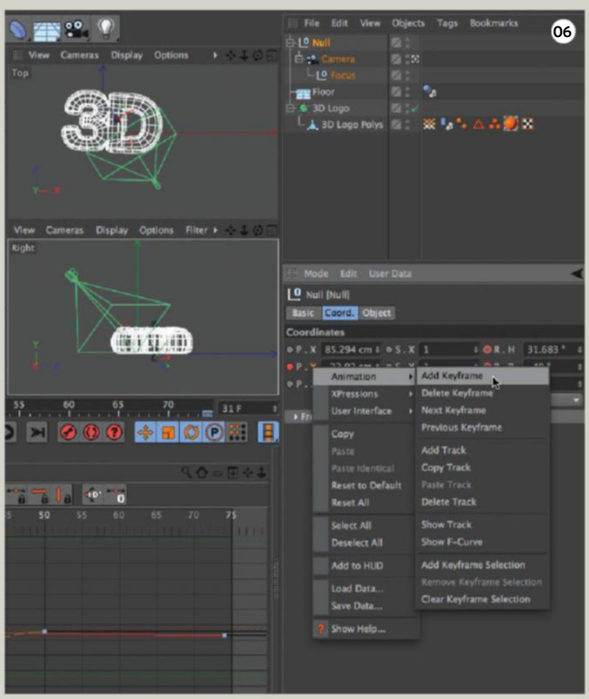
To finish, add a null object to the scene with a camera as a child. Zero-out the Camera co-ordinates and then set Z position to -600. Rotate and move the parent null until the logo is framed nicely. Add keyframes for the null rotation and Y position so the camera follows the logo as it drops. At around frame 30, when the logo inflates, add a keyframe for the Camera Z position, then move to the end of the project and set the Camera Z position to -700. Open the F-Curve manager and adjust the shape of the curve so the camera snaps back as the object inflates.

Using dynamics as morph targets

If you want the control of morphing and the simulation from dynamics, you can combine the two. Create a duplicate of your object, one with the soft body dynamics setup and one with a Pose Morph Tag. Enable points under the Basic tab of the Pose Morph Tag. Hide the dynamic object in the editor and then drop this object into the Poses field of Pose Morph to create an absolute morph target. When animating the morph sliders you can blend the shape and use the dynamics object as a morph target.







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Blender 2.68

Fur and particles in Blender

"How can I easily render fur using the particles system with Blender and Cycles?"

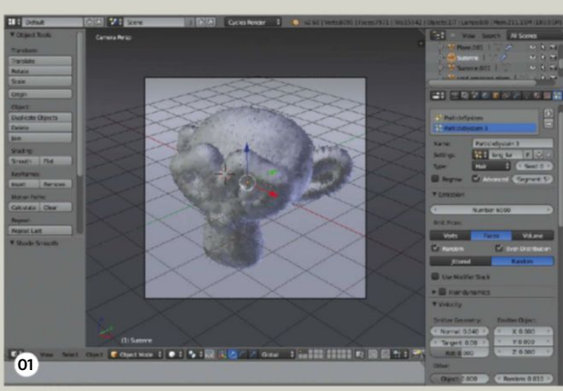
In the following steps we'll be using v2.68 of Blender, in which some new mesh-modelling tools have been added. The Cycles render performance has also been improved on Windows, plus you can now render hair on the GPU. If you have an older version, it's time to download the new one via www.blender.org.

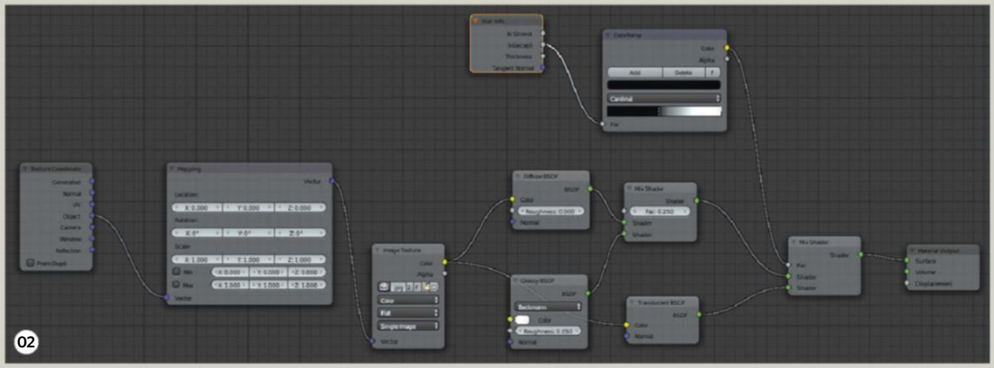
The Blender internal render engine works well for hair and fur, but here I'll show you how to use Cycles. It's an experimental feature, so change the Feature Set to Experimental inside the Render Settings of the Properties Editor.

We'll work on two hair settings: the first gives a result similar to fur, the second works well on a long-hair system. Blender uses a particles system to guide hairs, so select the Particles tab on the right of the Blender interface and add a system. Change the Type from Emitters to Hair and click Advance to see the main settings. The Segments field is the number of hair segments (ten for very long hair, five for shorter hair and two or three for short fur).

In the Emission tab we have the number of hairs, where to emit particles from and how to distribute them. The Hair Dynamics tab enables a hair physics simulation, while the Velocity tab gives the particle an initial velocity in the direction of a normal vector, tangent or in one of the X, Y or Z axes. The Physics tab controls particle movement.

The Render panel controls how particles appear when they are rendered and the Material tab selects hair material. When the Emitter flag is disabled, the emitter isn't rendered. The B-Spline flag interpolates hair using B-Spline, so turn this on if you want to use lower render values. The Display panel controls how particles are displayed in the 3D viewport. If you are using a lot of hairs, you can use the Display slider to specify the percentage of hairs shown. The Step Field sets the number of subdivisions of the rendered paths, which depends on the waviness of the hair. Use this carefully, because if you increase the render value by two you need four-times more memory to render. The Children panel makes it possible to work with a relatively low amount of main hairs, for which the physics are calculated. In this way we're able to work with thousands of hairs without freezing the CPU. Child hairs should be simple, as they are emitted from the parent hairs, or interpolated (which is especially useful for fur). We're also able to change the shape and kink of the child hairs. The Field Weight and Force Field settings control how much influence each type of external force has. The Vertex Groups panel enables us to change some hair attributes such as Density and Length. We have two extra panels: Cycles Hair Rendering and Cycles Hair Setting, which contain the settings for Cycles.





Cycles hair setting

Here are the main settings for the Cycles hair setting (find a full guide here: **tinyurl.com/3DABlenderHair**). Tip and Root values add to the hair thickness (it's better to apply scale to the object before adding a hair particle system). Shape controls the transition between Root and Tip (-1 constant Thickness equal to the Root and fast transition near the Tip, 0 Linear Transition, +1 fast transition near the Root and constant Thickness equal to the Tip). The Close Tip flag sets the Thickness to zero at the tip.

01 Establish your mesh

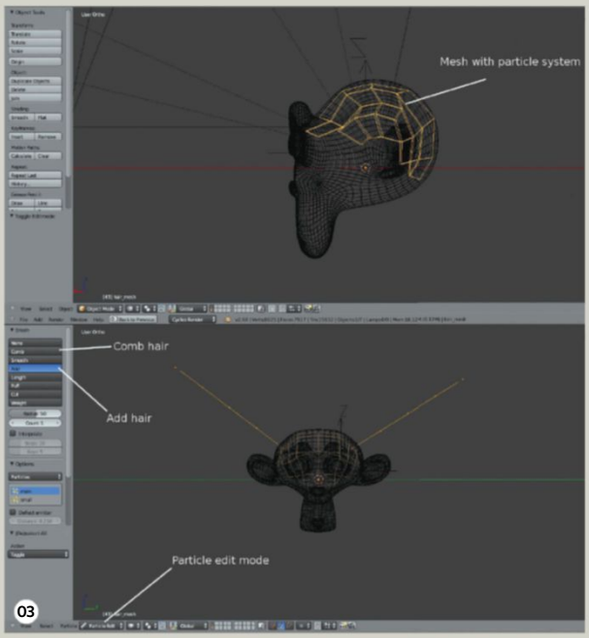
Open Blender, delete the default cube, add a Suzanne mesh (Shift+A>Mesh>Monkey), then insert a Subsurf modifier set at level 2 (Cmd/Ctrl+2) and set Shading to Smooth. In the Modifier tab, apply Subsurf, jump into Edit mode, select Suzanne's eyes and separate them from the mesh (hit P>By Selection). In Object mode, select Suzanne and add the first particles system (short_fur: 8,000 Particles, 3 Segments, 150 Interpolated Children), then add the second particles system (long_fur: 6000 particles, 5 Segments, Brownian Force: 0,124, Display Step: 5). Brownian Force makes the long_fur hair a little curved. Set the Cycles hair render as Accurate and Material in the Render tab as 2 for both hair systems.

02 Textures and material

Now find a tiger fur texture online, select Suzanne, add a diffuse material, connect the Color input with a texture node and select the tiger fur image. Add a second material (to be used from the particles system), use a mix of diffuse and glossy shaders, then use the tiger fur texture as a colour mixed with a translucent shader to make hair tips a little transparent. Here I used an Intercept node (change the View mode from 3D to Node Editor, then go to Add>Input>Hair Info) and a ColorRamp node that sets the point where hair starts to be translucent.

03 Particles for long hair

Add another monkey, jump into Edit mode and select the area where you'd like to put the hair. Duplicate (Shift+D), scale down a little (S) and separate the vertex (P). On long hair systems, it's better to work on a separate mesh. Come back into Object mode and add a particles system with 2 Hair, enable B-Spline and set Display Steps to 8. In the Children tab turn on Children Particles (set as Simple), Display as 10 and Render at 800. We need a lot of particles to achieve the correct-looking hair volume. Enable Kink as Curl (set Amplitude: 0,1, Frequency: 3 and Flatness: 0,17). Now jump into Particle Edit mode.



04 Set up the particles system

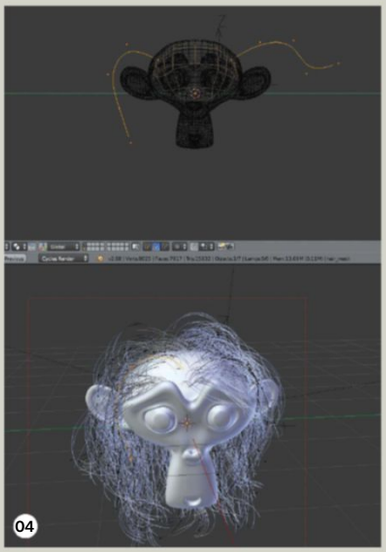
Once in Particle Edit mode, begin to add hairs one by one (starting from the back side of the head) and use the Comb brush to modify hair. If you need more segments for the hair, use the Rekey button (in the Particles menu). Don't forget that in the viewport we can only see ten children for each hair and at render time we'll have 800 children. If your computer has enough RAM and a good processor, you can try to increase the number of children displayed.

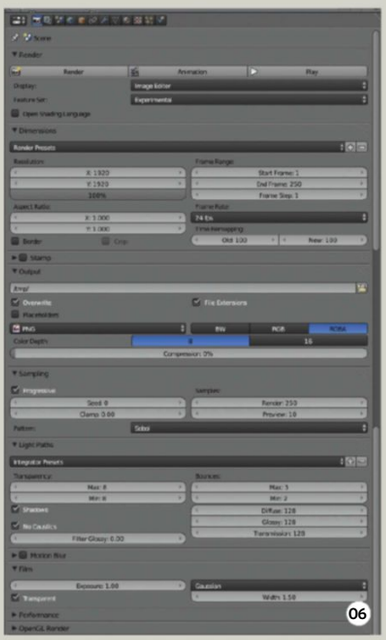
05 Material settings for long hair

The material for long hair is close to the settings for fur. We'll use a mix of diffuse and translucent shaders. A ColorRamp and Intercept node drives where the hair becomes translucent. An anisotropic shader with a blonde colour will give the hair shiny, realistic reflections. Add a voronoi texture, connect it with a ColorRamp node and then with a mixRGB node. Set the Blend Mode to Add, select a blonde yellow in the second Color slot and connect this to the Diffuse Color input, so the hair colour will appear less flat.

06 Start rendering

For the lighting I used three emitter planes (two cold and one warm light). In the World panel, set the Strength to 0. To improve the render speed, set Max Bounces to 3, Minimum to 2 and turn on No Caustic Flag. In the Sampling tab, set Render Samples to 250 and in the Film tab turn on Transparent Flag. The final render will be saved as a PNG with an Alpha channel. Hit F12 and wait! Once done, save as an RGBA PNG file and open with GIMP to adjust the levels.





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NUKEX

Generate point clouds

"How can I make simple reference geometry from footage with NUKEX?"

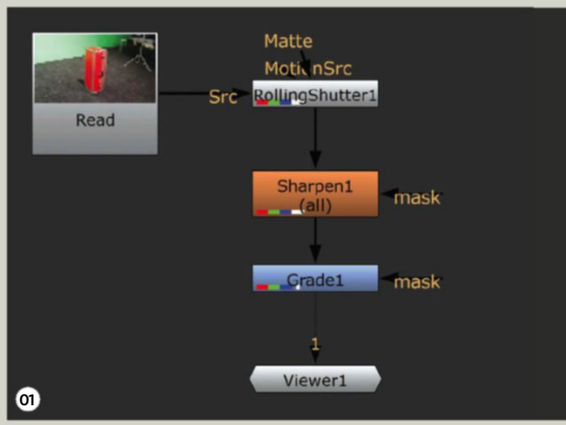
I am often tasked with integrating CG elements into real plate footage, but this process can be extremely difficult to get just right. Aside from the usual challenges of matching all of the visual markers – shadows, light direction, light intensity, ambient occlusion, depth of field, specularity, reflection, refraction – the real challenge comes when trying to get CG elements to sit correctly in 3D space.
If you are lucky enough to receive a locked-off shot, with no camera movement, the task of integration is far more straightforward. There is a whole range of tricks available for such integration and there is a certain amount of wiggle room when it comes to positioning your CG elements. But if you are presented with a transitioning camera shot, which has any movement up/down, left/right or forward/backwards, then you have just entered the world of parallax.

Without getting into the scientific phenomenon of parallax, put simply it means every object that is a different distance from the camera moves at a different speed. But that's just the fixed or static objects in the plate. Introduce some independent object movement and the task of integration becomes even harder.

As a result of such challenges, it has become much more important for the composite artist to understand 3D space and how to work within it. This is especially the case when you consider the amount of non-static, shaky cam shots being used in production these days.

Traditionally a moving camera shot gets tracked or matchmoved and a virtual camera gets created, but a series of 3D markers can also be created as part of this process. These markers can then be used as reference to help position CG elements into the correct position in the 3D space. If you think this sounds sort of simple, it isn't. Working in a world where your only 3D reference is a series of tiny markers, without any confirmation that any given marker is actually correct, is difficult.

Enter NUKEX, with its fantastic PointCloudGenerator node. NUKEX takes the tracking data, the plate information and generates a cloud of tiny points. This of course is no different to the markers previously mentioned, however, NUKEX enables you to take the point cloud and generate a basic mesh. There are certainly some issues to consider in order to get the best out of the process, but the difference it makes to positioning CG elements in 3D space is immense.

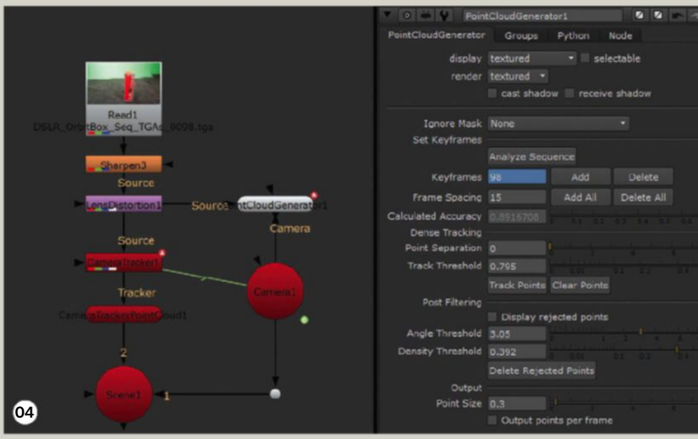


01 Prepare the footage

For the best point cloud results, it's vital that you get the most accurate camera track possible. This will usually start with preparing the footage for tracking and trying to remove any rolling shutter from the plate. The ROLLINGSHUTTER for NUKE plug-in by The Foundry is ideal for this process. If done correctly, this can almost halve the error rate of a camera track. It also pays to grade and sharpen the footage prior to tracking, as the tracker will analyse the pixel data and the more contrast the better. For compositing, this can be removed after the camera track is completed.

Create better point clouds

- Keep camera moves as simple as possible
- Nodal or Tripod pans won't deliver good results, the camera must be transitioning
- Avoid any motion blur, as this will result in a less accurate camera track
- Avoid fast camera transition for a more detailed track
- Consider correcting any rolling shutter effects if you're using a CMOS sensor-based camera
- Restrict the camera rotation around the object or scene
- Try to move the camera to reveal occluded objects or angles
- Experiment with the process and become fluent with the settings. This will help to better understand what is required at the shooting stage
- Use the Scene tab in the CameraTracker node to resize, rotate and position the scene before creating the point cloud



02 Track the camera

Now add a CameraTracker node and adjust the settings to match the shot. The more you know about the camera and lens used, the more accurate the track. The film resolution for the camera can be easily found online and the 35mm lens conversion factors can also help. Set the Number of Features to a reasonable amount (try 500) and also set the Keyframe Accuracy to High. When you have given the CameraTracker node as much information as possible, go ahead and select TrackFeatures, then SolveCamera.

03 Refine the tracking data

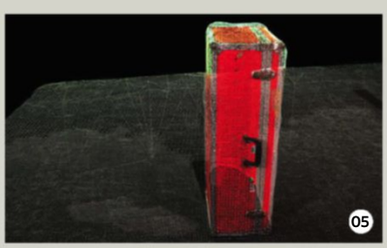
Once the camera solve has finished, go to the Refine tab and assess the Solve Error amount. An amount below 1.0 gives good results. The aim is to reduce this figure while still maintaining enough points to solve the camera. To bring down the Solve Error amount, increase Min Length and reduce the Max Track Error and Max Error values. Next click the Recalculate Solve button and continue this process until you have a good balance of low Solve Errors and enough points for the solve itself. When happy, click Create Scene, which will create a camera, a Scene node and a tracker point cloud.

04 Create a point cloud

With the 3D scene created, we'll add the PointCloudGenerator node. You will notice various node inputs. These need to be linked correctly. Pipe the Source input to the original footage Read node, then pipe the Camera input to the Scene Camera node. Click the Analyse Sequence button to select keyframes for triangulating point data. Now click the Track Points button to create the point cloud. You'll need to switch to the 3D viewport to see the point cloud data in 3D space, including the colour information from the original footage.

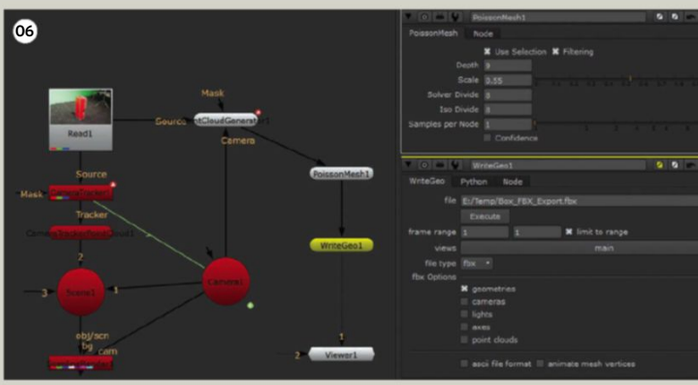
05 Generate the mesh

Once you're happy with the point cloud, you can create a mesh object. This can be done using two methods. The first is to add a PoissonMesh node that will use all of the points to create a mesh. This can then be adjusted to achieve a better resulting mesh. Another way is to use the Vertex Selection method and select various vertices within the viewport. Once you have selected the vertices, go to PointCloudGenerator in the Groups tab and click Create Group. You can now select the group and click Bake Selected Groups to Mesh. I find this technique offers greater control and flexibility.



06 Use the geometry

With the mesh complete, it can be used in a variety of ways. You can use it as a camera projection mesh, which is ideal for matte painting and set extension, for masking or matting out layers or elements in 3D space. The resulting mesh is also ideal for aligning and positioning elements in 3D space and offers excellent results in relation to parallax. Another use worth mentioning is to add a WriteGeo node and export the mesh as an FBX or OBJ object, for importing into any 3D application.



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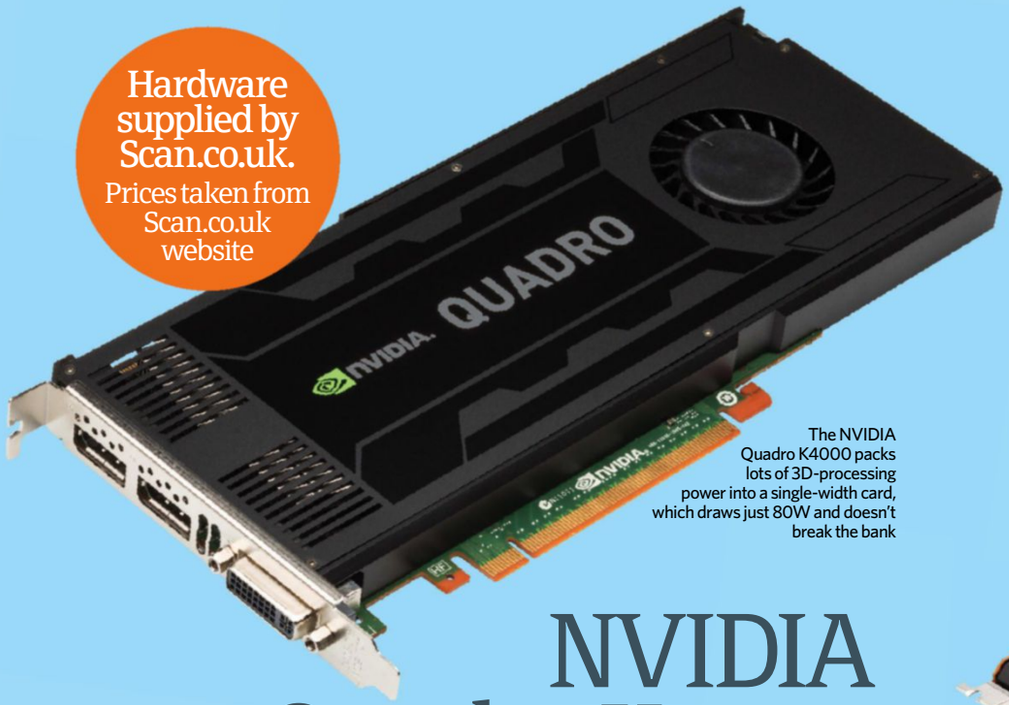


The NVIDIA Quadro K4000 packs lots of 3D-processing power into a single-width card, which draws just 80W and doesn't break the bank

NVIDIA Quadro K4000

The Quadro K4000 unleashes the force of NVIDIA's Kepler generation for a reasonable price, making it the mainstream, high-end, 3D accelerator of choice

REVIEWS BY James Morris, director of t-zero communications, UK

NVIDIA's latest GPU generation, Kepler, looks like another huge leap forward in performance, at least on paper. The Quadro K4000 is the new high-end contender, but with a price well below £700 (excluding VAT) it's hardly a wallet-breaking option among professional cards.

Looking at the specifications, the K4000 has improved quite considerably on its predecessor, the Quadro 4000. Where the previous card offered a very reasonable 256 CUDA cores, the new model triples this to an astonishing 768. Also, where the 4000 came with 2GB of GDDR5 memory, the K4000 offers 3GB. Memory bandwidth has ramped up too. Whereas the 4000 used a 256-bit interface to provide 89.6GB/sec, the K4000 has dropped the interface down to 192-bit. However, an increased memory frequency means that bandwidth has actually improved to a respectable 134GB/sec.

All this means the K4000 should trounce its predecessor's performance. However, up until Kepler was released, the Quadro's CUDA cores ran at twice the core speed. Although the K4000 also has a faster core clock than the 4000 and three-times the CUDA cores, it won't quite provide three-times the performance. In fact, double-precision performance for the Kepler range is noticeably down on the previous generation. But it also drops power consumption impressively from 142W for the 4000 to just 80W for the K4000.

For most everyday 3D work the Quadro K4000 shows considerably improved performance over its predecessor. We tested the K4000 and W8000 using a Scan 3XS workstation based around an Intel Core i7 4,770K processor with 16GB of DDR3 SDRAM. The Maxon Cinebench R11.5 OpenGL test produced a result of 99.96, a score we have only ever seen bettered by this month's AMD FirePro W8000.

The results from SPEC's Viewperf 11 were also impressive, with 71.59 in catia-03 being the fastest we've ever seen. The lightwave-01 result of 98.13 was only marginally bettered by the W8000, making this the second fastest we have tested, as was the SolidWorks sw-02 score of 75.19, although this was a little further behind the W8000. The maya-03 score of 125.49 was the fastest again, by a very small margin, so performance is outstanding across the board.

The Quadro K4000 has a single DVI-I plus two DisplayPort connections, supporting up to four monitors with a three-pin stereo output port

Essential info

Price: £624 ex VAT (approx. $965 US*)

www.nvidia.com

OPERATING SYSTEMS

- Windows XP, Vista, 7, 8 and 8.1
- 32-bit or 64-bit Linux

TECHNICAL SPECIFICATIONS

- DirectX 11
- OpenGL 4.3
- Shader Model 5.0
- 768 CUDA processing cores
- 3GB GDDR5 RAM
- 2x DisplayPort
- DVI-I, 4,096 x 2,160 resolution (DisplayPort 1.2)
- 80W max power

With some of the fastest 3D viewport test scores we have ever seen, the Quadro K4000 will make light work of almost any modelling job

The good & the bad

- ✓ Stunning performance
- ✓ Relatively inexpensive
- ✓ Low power consumption
- ✓ Single-width card
- ✘ Reduced double-precision performance over previous generation

Our verdict

Features	8/10
Ease of use	9/10
Quality of results	10/10
Value for money	10/10

"The NVIDIA Quadro K4000 is very fast, relatively inexpensive for its capability and has low power consumption too"

Final Score 9/10

*Price conversion correct at time of printing

AMD FirePro W8000

AMD's FirePro W8000 packs a huge amount of power alongside the ability to drive up to six monitors at once

AMD's FirePro W series has been on the market for longer than the NVIDIA Kepler generation, having been released about a year ago. However, it remains an impressive range, with some clear areas of superiority over its NVIDIA competitors. The W8000 is placed at a slightly higher level in price and features than the Quadro K4000, as there isn't quite a direct comparison between members of the two ranges, with the W7000 positioned slightly lower down.

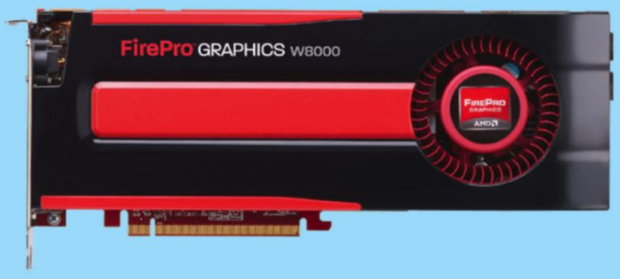
The W8000 sports 1,792 stream processors and 112 texture units, compared to the 1,600 stream processors of the previous FirePro generation's top V9800 model. This powerful GPU is allied with 4GB of GDDR5 memory and the W8000's 256-bit memory interface enables it to enjoy 176GB/sec of bandwidth – 31 per cent more than the Quadro K4000 – which should pay dividends when handling large textures.

The W8000 isn't all about brute performance, either. AMD's Eyefinity technology means the W8000 can drive up to six displays simultaneously with DisplayPort 1.2 multi-streaming, whereas the Quadro K4000 only supports four displays. So, if you need to create a truly huge 3D video wall, the W8000 could be the card for you. This is a power-hungry 3D accelerator, however, drawing up to 225W and requiring two PCI Express power connections. The Quadro K4000 only needs one and is a single-width card, whereas the W8000 requires two slots.

For testing we turned to the same Scan 3XS workstation as we used for the NVIDIA Quadro K4000 to provide a level playing field. The most impressive result from the W8000 was in Maxon Cinebench R11.5's OpenGL test. The score of 132.11 smashes every card we have previously tested, including the K4000, by over 30 per cent.

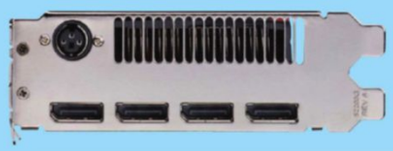
The W8000 achieved almost as good results in SPEC Viewperf 11, with the fastest score we have ever seen in the SolidWorks sw-02 viewset of 85.81, although the result of 60.71 in the catia-03 workload was behind NVIDIA's Quadro K4000. The lightwave-01 result of 99.36, conversely, was again the quickest we've seen, albeit only pipping the K4000 by a small margin. The tables were turned in maya-03, although the result of 123.37 is still the second fastest of any card we have tested. Overall, these are a highly impressive set of results.

The 225W consumption makes the W8000 a somewhat power-hungry card and two PCI Express power connections are required, as well as two slots



The AMD FirePro W8000 is a huge card in every way, with tons of 3D modelling power and a whopping 4GB of frame buffer

The W8000's quartet of DiplayPort connections enable up to six monitors to be attached, with Eyefinity technology able to turn these into a giant display wall



Essential info

Price: £955.45 ex VAT (approx $1,476 US*)

www.amd.com

OPERATING SYSTEMS

- Windows XP, Vista, 7, and 8
- 32-bit or 64-bit Linux

TECHNICAL SPECIFICATIONS

- DirectX 11
- OpenGL 4.2
- Shader Model 5.0
- 1,792 Stream processors
- 4GB GDDR5 RAM
- 4 x DisplayPort
- 4,096 x 2,160 resolution (DisplayPort 1.2)
- 225W max power

The good & the bad

- ✓ Stunning performance
- ✓ Supports up to six monitors
- ✓ 4GB frame buffer
- ✗ More power-hungry than the Quadro K4000
- ✗ Requires two slots
- ✗ More expensive than the Quadro K4000

Our verdict

Features	10/10
Ease of use	9/10
Quality of results	9/10
Value for money	8/10

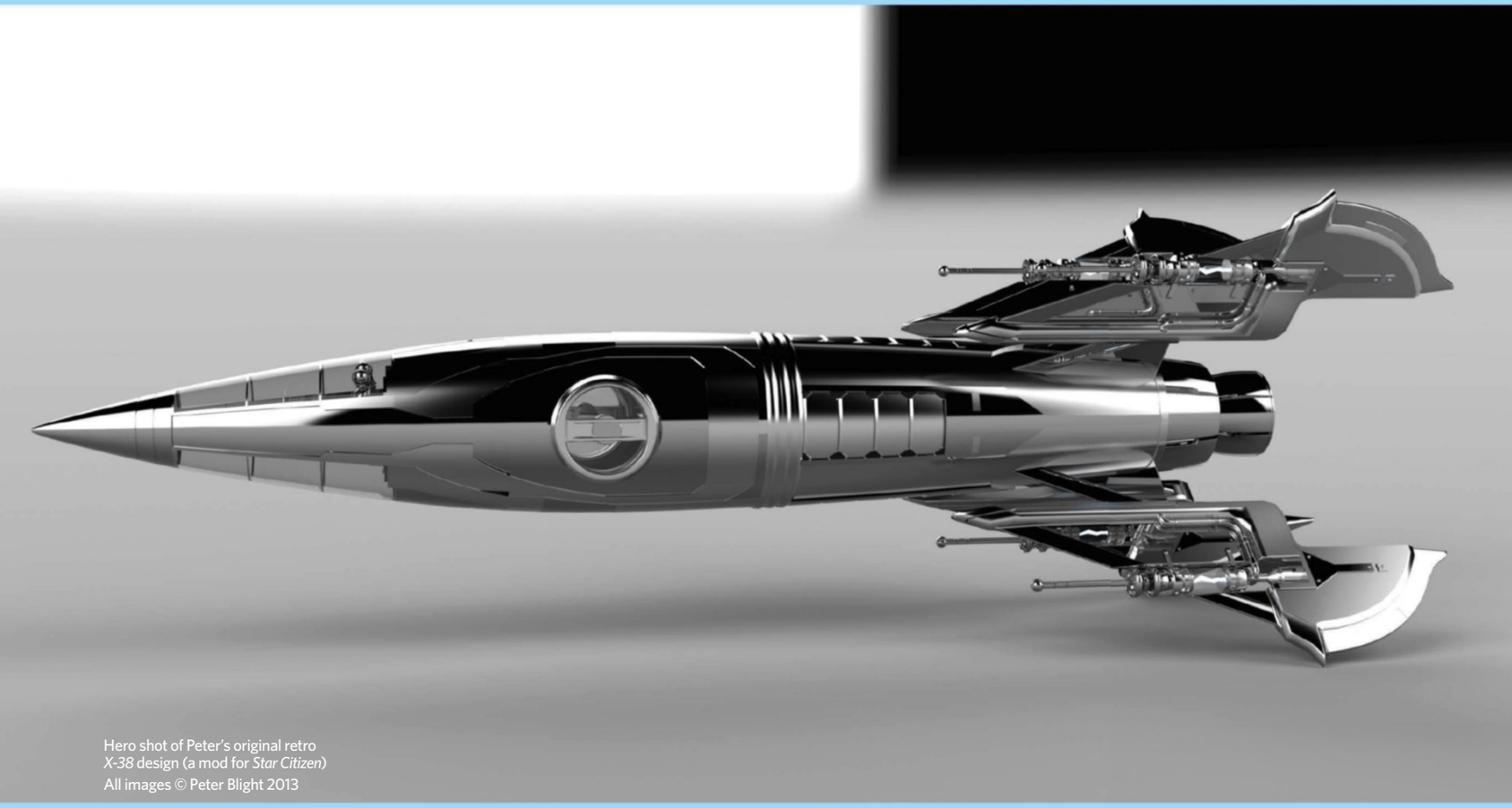
"The AMD FirePro W8000 is a hugely powerful card with supreme multi-monitor support"

Final Score 9/10

Conclusion

The NVIDIA Quadro K4000 and AMD FirePro W8000 are both extremely strong cards, offering huge amounts of performance for the money. If you want a huge multi-display workspace and particularly if you run Maxon CINEMA 4D, the W8000 should be your card of choice. But the NVIDIA Quadro K4000 is also a stunningly quick professional 3D accelerator. When you factor in the reasonable price as well, this is a highly commendable option for almost any high-end 3D work, with only a few applications better served by AMD's notably more expensive FirePro W8000. For sheer performance for the money, the K4000 steals the show.

*Price conversion correct at time of printing



Hero shot of Peter's original retro *X-38* design (a mod for *Star Citizen*)
All images © Peter Blight 2013

Bunkspeed PRO Suite 2014

Bunkspeed's latest release offers a whole raft of new features that look to speed up workflows and provide stunning results, including the incredible Fast render mode

REVIEW BY Peter Blight, sci-fi and fantasy concept designer, Australia

As a concept designer specialising in sci-fi vehicles, specifically for both the feature film and videogames industries (www.peterblightconceptdesign.com), tools such as Bunkspeed are incredibly important to my workflow.

I first started using Bunkspeed a year ago when I saw a video of one of Hollywood's brightest design stars, Daniel Simon, rotating one of his *Cosmic Motors* vehicles raytraced in all its iray glory in near real-time. I was gob-smacked. I knew I wouldn't match that performance on a tight budget, but I set about building a PC anyway that would at least get me started. As it turns out, the i7 Quad-core with 16GB of RAM and an NVIDIA GTX 580 3GB gaming card (following the recommended card specs on Bunkspeed's site) was surprisingly effective at running this software well and cost me about $2,000 Australian dollars back then.

Skip forward to today and I'm happy to be reviewing something that makes that very same rig feel like it has transformed into a pro system without even opening the case. This is thanks to the new and arguably best reason to buy or upgrade to Bunkspeed PRO Suite 2014: Fast mode.

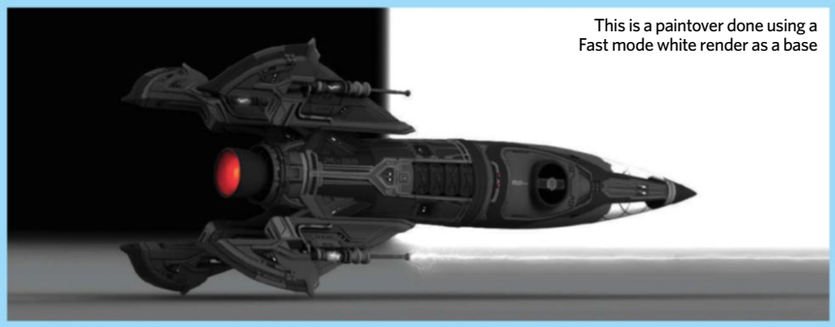
The name speaks for itself. Fast mode churns through 100 passes blisteringly fast and then somehow ends up with a render that looks almost as good as a final-quality render of 2,000 passes (Voodoo stuff). This is fantastic for outputting a huge selection of images in a short time and so greatly enhances the speed of painting, lighting and design appraisal. Most of all, by removing the tedious waiting element from the rendering process, it finally makes this most anticipated of moments actually fun! My rocket ship, the *X-38* (a mod for the highly anticipated space game, *Star Citizen*) took five seconds to render in this mode at 720p. That's a bit over 200,000 tris, but I tested a 1,500,000-tri model and it was only a few seconds slower. I also used one of these renders in white matte material as a base for a Photoshop paintover, in order to plan out the full detail pass on the ship model.

Another new feature worth mentioning is the VR Render output. I set it going for 20 minutes and it gave me a multi-height, rotatable VR file (about 400px wide for this test, all other settings on default) to preview the model without needing to open any software. It took 288 images in total to create the file. There is also a new Panoramic mode handy for architects doing interiors. As my ship's interior was incomplete, I had a go at it from outside and it worked as expected.

Tinkering around, I found Easy mode is a nice feature to reduce clutter and it toggles by just hitting the spacebar. It gives quick access to all the important elements, such as material assignment, importing models and

A Fast mode white render with default material modified to glossy

An opulent colour scheme, for the more showy interstellar traveller



This is a paintover done using a Fast mode white render as a base

camera settings. There's also a handy Ortho wheel in the floating Camera menu, where you click on the arrows to cycle views around it, the small circle in the middle being the top view. The Pro filters in the Camera menu were of interest, with sepia being my favourite. There are six post-processing adjustments (and a colour filter) that can be applied to the images in the main Camera menu as constantly updating viewport effects. These are quite handy, as there's no need to open Photoshop to change brightness, saturation and the like.

The Accurate Render mode is slightly faster than before and is still the best option for a final print-resolution image. In closing, to see my work rendered as if it were a real, tangible vehicle is the ultimate thrill. An enjoyable-to-use interface without too much fuss, coupled with lightning-fast renders, makes Bunkspeed 2014 the package to beat for hard-surface rendering. Nice work guys!

Essential info

Price: $3,495 US (approx. £2,231*)

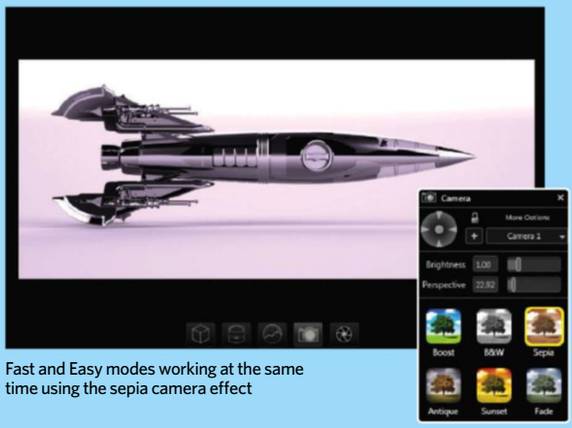
www.bunkspeed.com

OPERATING SYSTEMS

- Windows 7 & 8, 64-bit

OPTIMAL SYSTEM REQUIREMENTS

- Quad-core CPU or higher
- 8GB of RAM
- At least 1GB of disk space
- NVIDIA CUDA-enabled graphics card with 120+ CUDA cores
- 1+ GB graphics memory
- Monitor 1,280 x 1,024 or higher



Fast and Easy modes working at the same time using the sepia camera effect

The good & the bad

- ✓ Fast mode is just that
- ✓ The quality of renders, even when in Fast mode, is consistently photoreal
- ✓ Photoshop-style post-processing applied to viewport in real-time
- ✓ VR Mode enables you to share the interactive experience with others
- ✗ Could really use some environment fog to fade objects as they get further away
- ✗ No particle support

Our verdict

Features	9/10
Ease of use	9/10
Value for money	8/10
Quality of results	10/10

> "Worth the price of admission for the Fast mode alone"

Final Score 9/10

*Price conversion correct at time of printing

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RaySupreme v1.1

Jahirul Amin takes a look at Ray Supreme: a first-of-its-kind Text-to-3D package

REVIEW BY Jahirul Amin, director/producer and associate lecturer at NCCA, UK

RaySupreme is not your average 'I want to be like everyone else' package. It introduces a new methodology of creating environments through its Text-to-3D (T-t-3D) technology. Now you may be thinking 'Text-to-3D? How does that work?' At least, that was the first thought that ran through my mind. But after watching a few demos and trying it out myself, I found it does just that: you type and it creates. The software does a pretty good job of it, too.

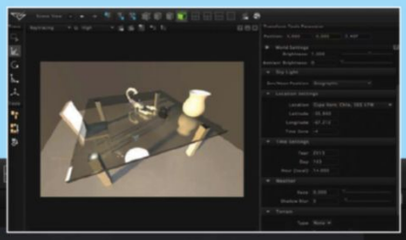
RaySupreme enables you to create digital models and environments, then render them in a traditional manner as you would in most 3D applications. You can also lay out the objects to create the environments as you would in any other package by translating, rotating and scaling. These objects can be uploaded to a development environment, enabling others to use them and at the same time you can also download assets to use in your scene files. What makes RaySupreme inventive and unique is that it reaches out to people with all levels of technical capability through its Text-to-3D workflow.

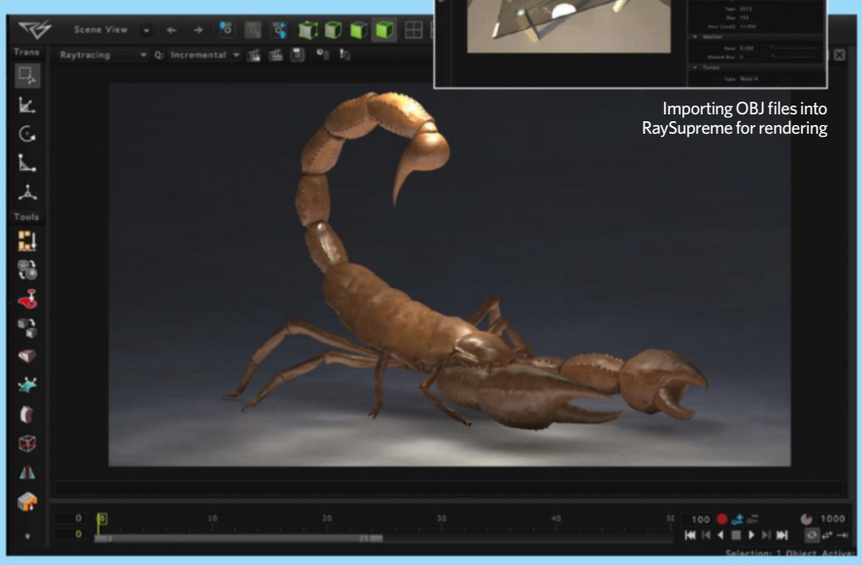
For the T-t-3D to work, you need to first download objects, materials and NLP (Natural Language Parser) Extensions from the RaySupreme server to your local machine. Switching to the Language Editor mode, you can then use natural English to bring assets from the library into the scene. For example, type 'Create a table' and it creates a table. Type 'Create a table. Create a vase' and, hey presto, you have a table and a vase. Then type 'Create a table. Create a vase. Place the vase on the table' and it will do just that. So, not only can you create assets, you can start positioning them as if you were some feng shui master doing a spot of interior decoration. It's actually pretty amazing to see it in action.

Being into education, I can see this working brilliantly for new users wanting to step into a 3D package to create environments. The combination of using language and then seeing such immediate results would be great for teaching kids and adults about 3D space. It's the kind of package that wouldn't scare off a first-time user. Equally, however, it delivers for sophisticated users. For example, I could see it working beautifully for architectural visualisation and for professionals who need to communicate a 3D concept fast and effectively. For both new and seasoned users, the accompanying documentation gives a thorough grounding on the necessary whys and wherefores.

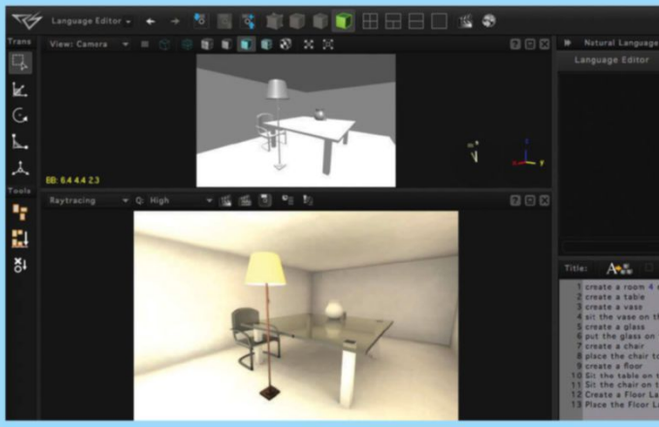
Considering its incredibly reasonable price tag, RaySupreme has every chance of gathering a big following and deservedly so.

Manipulating the Location and Time settings to get the desired results





Importing OBJ files into RaySupreme for rendering



Using the Text-to-3D technology to create a small environment

Essential info

Price: $40 US/£26*

www.braindistrict.com

OPERATING SYSTEMS

- Mac OS X 10.7 or Later
- Windows® 8 or Windows® 7 64-bit Professional
- Linux 64-bit

OPTIMAL SYSTEM REQUIREMENTS

- 64-bit Intel or AMD multi-core processor
- 4 GB RAM minimum (8 GB recommended)
- 1 GB free hard drive space
- 3-button mouse

The good & the bad

- ✓ Ideal for new users
- ✓ Unique Text-to-3D
- ✓ Helpful documentation
- ✓ Results are quick
- ✓ Value for money
- ✗ Can be prone to crashing

Our verdict

Features	8/10
Ease of use	8/10
Quality of results	7/10
Value for money	9/10

"Working for novices and professionals alike, RaySupreme turns words into 3D deeds with great success"

Final Score 8/10

*Price conversion correct at time of printing

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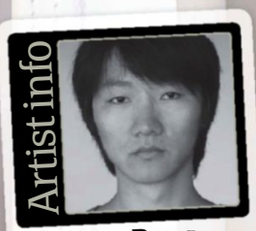

RenPeng Dong

Personal portfolio site
www.oldrhyme.cgsociety.org
Country China
Software used
3ds Max, Maya, ZBrush, Mudbox, Photoshop, V-Ray

"I saw an image on a website that was like a kind of transparent man blending with his background, which brought me this great idea... [I] decided to show the feeling of part drying paint, part real, part plaster"

Non-US readers turn to page 94

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workspace 3D

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Tim and Fleur Clapham discuss Australian company Luxx and the secret of its success

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Pixomondo

We meet the team behind the ferocious dragons and epic battles of *Game of Thrones*

inside

> "We are thrilled to be working with some of the world's most creative talent at Pixar. This cements KATANA's already impressive pedigree"

Bill Collis, CEO at The Foundry, discusses the company's exciting future with Pixar, Page 104

SIGGRAPH 2013

Anaheim Convention Center

Read all about the announcements from the biggest CG event of the year

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Ryan Ward on **01202 586415** or **ryan.ward@imagine-publishing.co.uk**

"I can't wait to see what artists create... the possibilities are limitless," says Chris Bradshaw, Autodesk senior vice president on the Creative Commons Open Learning initiative

© Colin McLaughlin/Liaison

New software from SIGGRAPH 2013

From LightWave 11.6, NevronMotion and ChronoSculpt to CINEMA 4D R15, SIGGRAPH 2013 didn't disappoint

After visiting SIGGRAPH 2013, along with over 17,000 artists, scientists, students and academics at California's Anaheim Convention Center, we were amazed by how much news and software has emerged from this year's conference, despite Autodesk not actually hosting a booth.

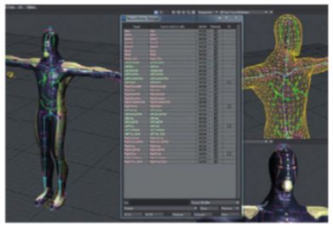
LightWave 11.6, as well as the new $299 mocap plug-in NevronMotion, were unveiled by the NewTek LightWave 3D Group. LightWave 11.6 introduces features such as the Genoma character-rigging system with modular presets, as well as Predator and Prey Flocking capabilities. There are also new import and export options to support output to 3D printers.

NewTek's surprise third announcement was a standalone application, ChronoSculpt; a new time-based sculpting tool for all major 3D software pipelines. This introduces the ability for artists to use Sculpt, Drag, Pinch, or Erase tools to deform and manipulate geometry over time, as well as paint out errors on dynamic simulations, among others.

The main stage at the MAXON exhibitor booth #315 also featured new software: the newly announced CINEMA 4D R15, scheduled to ship in September. The new release includes the ability for users to sculpt directly onto any polygon model and included Team Render, a new Project Mesh feature and a Bevel tool to create rounded corners with flexibility, as well as new capabilities added to its typography toolset.

News from Autodesk

Though absent from the SIGGRAPH booth floor, Autodesk announced the launch of Autodesk FBX Review, a free standalone app for Windows 7 and 8 devices to let artists review 3D assets, including models, environments and character animations. Another announcement was the implementation of a Creative Commons Open Learning initiative to enable the worldwide Autodesk user community to freely share knowledge.



NevronMotion supports the Microsoft Kinect camera, enabling artists to capture live rig motion, retarget the motion, then easily adjust mocap positions

The Foundry to collaborate with Pixar on tool package

The Foundry and Pixar announce a strategic collaboration to unite KATANA and RenderMan

Marking the first formal collaboration with regards to the future development of RenderMan, the pact aims to result in a best-of-breed toolset for high-end lighting and rendering. This will involve the two pieces of software being bundled together for retail sale.

The Foundry's CG and VFX lighting tool, KATANA, and Pixar's famous RenderMan rendering engine have already been used together on Disney/Pixar's short 'The Blue Umbrella', which played before *Monsters' University*. This involved significant engineering effort from both parties to support RenderMan workflows, as well as new features being built into KATANA based on Pixar technology.

Each copy of KATANA will now include a full $2,000 RenderMan Pro Server license as standard, incorporated into the first ten KATANA interactive desktop licenses, along with a base set of shaders and ten free KATANA batch render licenses to support any additional RenderMan renderers. The companies will be further developing and testing both software applications together to ensure they work seamlessly.

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"We are thrilled to be working with some of the world's most creative talent at Pixar, as well as the RenderMan team. This development cements KATANA's already impressive pedigree," says Bill Collis, CEO at The Foundry

HAVE YOU HEARD? • Autodesk will be hosting a new conference, Cave, in Las Vegas this December

Ed Ulbrich steps down

Former CEO of Digital Domain will continue to work in a creative consultant role

Former CEO Ed Ulbrich, who has been with Digital Domain since its inception in 1993, has stepped down to become a creative consultant and will continue as a producer of the studio's upcoming film, *Ender's Game*.

Ulbrich was appointed CEO when the multiple Academy Award-winning VFX company was purchased in September 2012 and has stepped down following a further change in ownership.

"I've spent many wonderful years at Digital Domain and was honoured to have been trusted to lead the company through its acquisition and to help set the strategic path forward," Ulbrich said. "Now, with the ownership having brought the company under Sun Innovation – a solid, significant public company – and Digital Domain 3.0 into its next phase, I'm looking forward to returning to the creative side of the business to pursue producing full-time. I look forward to continuing a fruitful relationship with Digital Domain 3.0 as we move forward."

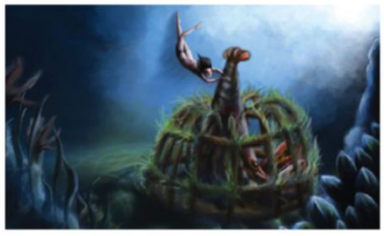
Ulbrich referred to version 1 of Digital Domain as the Cameron-Winston-Ross Company. Sun Innovation's executive Daniel Seah has now taken the reins as CEO

BFX Festival in September

The new VFX and Animation Festival kicks off this month

Taking place from 25-29 September, the BFX Festival includes a speaker series from leading VFX artists and animators working at studios such as DreamWorks, Double Negative, MPC, Cinesite and Framestore.

Specialist workshops will also take place with speakers Scott Eaton, Dr. Stuart Sumida and Adam Redford, who have worked on feature films such as *Gravity*, *47 Ronin* and *Wrath of the Titans* among others. Tickets for the festival events start from £12.50, or £10 for students. For more information and to book your place at this exciting event, visit www.bfxfestival.com/book-tickets.



BFX offers a careers hub, a free concept art display, a variety of movie screenings and tech demos from companies such as Autodesk, Next Limit and Adobe

Maya and 3ds Max 2014 extensions

Autodesk announces new features in its 2014 packages

The 2014 extension for Maya and Mudbox are expected on or after 16 September, with the 3ds Max extension expected on or after 30 September

Autodesk subscription customers can soon take advantage of the latest extensions for Maya, Mudbox and 3ds Max. These provide access to technology such as XGen Arbitrary Primitive generator for art-directing CG hair, fur, feathers and foliage in Maya. New support for Python has been added to the 3ds Max extension, giving artists the ability to execute Python scripts from MAXScript and the 3ds Max command line. The Mudbox 2014 extension offers the ability to create topologically symmetrical meshes while retopologising.

Software shorts

Bringing you the lowdown on product updates and launches

The Recording Room plug-in

Kobold Charakteranimation has released The Recording Room, enabling users to record their own movements inside CINEMA 4D using Microsoft's Kinect camera. The plug-in also includes The Editing Room, where the recorded movements can then be edited through Forward Kinematic to modify aspects of the movement. For pricing and to learn more, visit tinyurl.com/3DARecRm.

Animators Toolkit – CamRig 1.1 Utility

Newly included in the latest update of the Animators Toolkit, a set of 3ds Max scripts to automate common rigging and animation tasks, the CamRig 1.1 Utility enables users to show off their scenes with a fully featured, easy-to-use camera rig. The tool creates a rig that makes smooth, cinematic camera movement much simpler without the use of plug-ins or conventional setup. For pricing and more, visit animatorstoolkit.com.

Golaem Crowd 2.5

Golaem has announced the latest version of Golaem Crowd, the crowd-simulation plug-in for Autodesk Maya. The update adds Maya 2014 support, as well as the ability to instantiate any rigid shape object. It also features an interactive viewport preview and customisable visual and animation diversity. Golaem Crowd 2.5 for Maya 2012, 2013 and 2014 supports Windows 64-bit and Linux 64-bit. Learn more at tinyurl.com/3DAgolaem.

Auto-rigging games

Anzovin Studio provides compatibility with game engines for its auto-rigging plug-in

The rigs generated in The Setup Machine for Games can also be returned to an editable state at any time with the Restore Rig

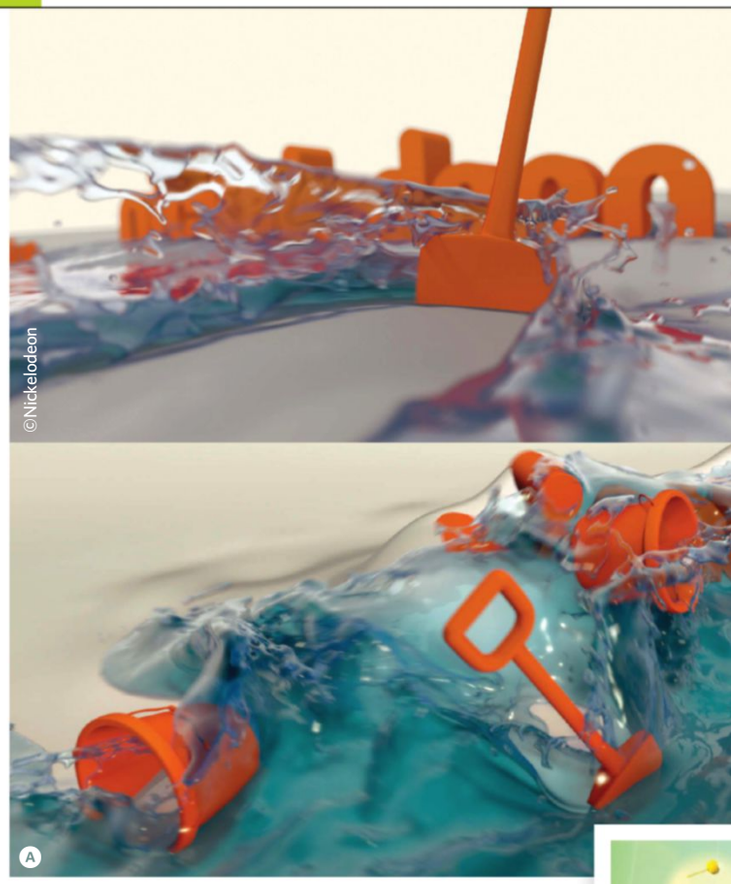
Anzovin Studio has released The Setup Machine for Games, a new version of its Maya auto-rigging plug-in designed to work with most videogame engines, including Unreal and Unity. The plug-in, which works for Maya 2011 and later, generates a flexible character rig with features such as Stretchy Limbs, Anti IK Pop and Smart IK/FK switching. These can then be backed down to a simple skeleton for easy import into any game engine that supports FBX. Find it at **www.anzovin.com/tsmg**.

DID YOU KNOW? ▪ Luxion has introduced integration between KeyShot and Pixologic's ZBrush

Studio Access

Hello Luxx!

We talk to CINEMA 4D and industry expert Tim Clapham about running his own studio, Luxx



After 14 years of running successfully, both directors of HYPA took the industry by surprise when, in 2009, they risked closing the Brighton-based motion graphics and animation studio's doors to pursue new creative paths.

Luckily, any doubts about whether long-time partner at HYPA and industry-recognised expert Tim Clapham would stop producing work were short lived. Clapham had already relocated from the UK to Australia to be with his girlfriend, Fleur Clapham, and together they established Luxx, a new company in Sydney, only a year later.

With Luxx, Clapham dreamt of bringing together a boutique collection of creative professionals from around the globe and not just to deliver high-quality studio work. He also aimed to provide an online training resource for the visual effects community, where professionals from the studio could freely share their expert knowledge with no middlemen in the way – artist-to-artist. In the three years since its conception, Luxx has certainly fulfilled one part of his vision, having already produced award-winning work for the likes of HBO, Nickelodeon and Virgin Atlantic.

The most recent project from the company is the acclaimed Ubisoft launch trailer for the upcoming *Tom Clancy's The Division* game, which delivers a terrifying vision of the future seen through a powerful universe of intricate CG typography. Focusing on facts such as the 2007 Directive 51 laws implemented by President Bush, combined with a hypothetical scenario of bioterror strikes, a flu pandemic and subsequent economic collapse, Luxx delivered the entire trailer without the use of any characters. The new trailer represents the project Clapham is most proud of having worked on at Luxx so far. "So many people are talking and asking about it that Maxon has invited Tim to make a presentation about the project at IBC in Amsterdam on 13-15 September," begins Fleur Clapham, producer at the company. "It was one of the most rewarding projects to work on, with a team comprised of some of the world's most incredibly talented artists."

With words built from virus cells; torn American dollars; and a fragile transportation infrastructure being the only way for the trailer to convey its frightening apocalyptic message, there was a lot of pressure for the team to make sure the technical details were impeccably created. From the elaborately dynamic simulations of the typography, to the lighting and camera movements, a large number of elements had to be modelled, textured and animated

> "Managing workflow, deadlines and creative expectation is key to maintaining a semblance of success; not to mention the occasional free weekend"
>
> **Tim Clapham,** director of Luxx

Luxx is a motion graphics and 3D animation specialist, creating innovative and cutting edge design for Broadcast, Advertising and Online Delivery. It develops its clients' visions from the ground up using a highly dynamic pool of talent to cover all disciplines required, ensuring successful and rapid completion of all its various projects.

www.luxx.com.au

Country Australia

Software used CINEMA 4D, Photoshop, Illustrator, After Effects, Premiere, Trapcode Suite, Imagineer Systems Mocha, RealFlow, Syntheyes, Final Cut Pro

Contributors

Tim Clapham
Director

Fleur Clapham
Producer

Patrick Clair
The director behind *Tom Clancy's The Division* trailer

Portfolio highlights

Here are some of the major projects Luxx has worked on:

2013 *Ubisoft Launch Trailer*
2013 *HBO Action Nation*
2012 *Discovery Kids*
2012 *Saturday Disney*
2012 *Nickelodeon IDs*
2011 *VIVA*
2011 *MSN Talk advertising*
2011 *HBO Summer*
2011 *Virgin Atlantic In-flight Entertainment*

A CINEMA 4D has long been Luxx's software of choice thanks to its flexibility. Clapham himself is a beta tester for Maxon, often suggesting ways that C4D could be improved or enhanced

B Another project from a major client was the broadcast packaging for the rebrand of Channel 7's flagship children's show, *Saturday Disney*, for which Tim Clapham was the 3D lead

© HBO Asia

E

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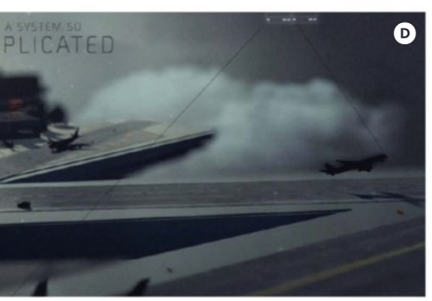


D

beautifully within a very short production deadline. "With every 3D scene we then also needed to translate the cameras and lights into post, so the compositors could integrate graphics and environmental effects seamlessly," Fleur Clapham describes.

Although the studio collaborated with Antibody to create the trailer, Luxx normally works on a fairly even balance of projects that includes both collaboration with other studios and work completed fully in-house. An intriguing option the studio has offered is the ability for clients to practically rent out the talent at Luxx – meaning the team will move in-house to work within the client's studio. "The advantages of working directly with different teams on the various projects are the fresh ideas that can arise and the alternative creative directions a project can take due to new blood in the studio," Fleur Clapham explains, though adding that it's quite rare for Luxx to work with other teams for the complete duration of a job.

Meanwhile, in order to implement his hopeful long-term aim of providing a direct artist-to-artist learning platform from the experts at Luxx, Tim Clapham also recently launched the helloluxx website. "Helloluxx evolved from a small page on the HYPA website long before Luxx was born," says Fleur Clapham. "Tim was excited by the technology and wanted to help build the creative community. The blog was a way of getting his understanding of the C4D program into the CG fraternity and helloluxx is a direct extension of Tim's ten-year-old thought." The

Familiar tools

Tim Clapham explains why he has relied on CINEMA 4D as a primary tool since being introduced to it during his time at HYPA

"At HYPA, when we created the LEGO TVCs, we used LightWave and unfortunately at the time it was fairly unstable on Mac. We also used Final Cut Pro v1 and back then Apple bundled CINEMA 4D Go with the software. This was our introduction to C4D. Since then we've upgraded at every new release and it has always been the 3D app of choice for Luxx. It is such an accessible program, you can sit down with CINEMA 4D and within minutes create something cool. With features such as MoGraph, Dynamics, Hair, Cloth, Xpresso and a bunch of character tools, you have the opportunity to solve most problems a project might throw at you."

C You can visit helloluxx, Luxx's recently relaunched online training database, at helloluxx.com. If you want to sample Tim Clapham's training, check out our C4D tutorial on page 88

D As well as a large number of complex models, the game trailer for *Tom Clancy's The Division* also included elaborate dynamic simulations and many intricate particle systems

E Luxx was behind the animation and print artwork for HBO Asia's Summer Blockbusters Movie campaign. The project received acclaim at the Promax BDA New York 2011 Design Awards

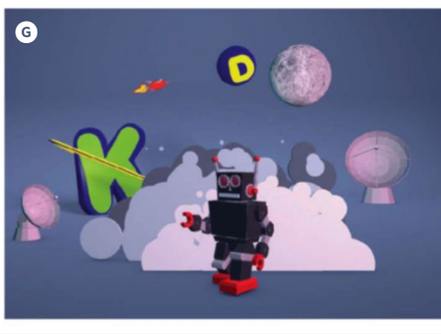
©Nickelodeon

website has now also relaunched to include a Shop section of paid training by Tim Clapham, Alex Lehnhert and Marijn Raeven, though this will still be complemented by many of the free tutorials offered on the site.

Despite the fact that the studio has been producing a plethora of successful work and training resources for helloluxx in the relatively short time since Luxx began, Tim Clapham admits that starting up and running as director at the helm of his own studio has not come without its trials. "The main challenge is, and has been for a great deal of time, the customer expectations balanced against deadlines and budgets. The common issues are that budgets seem to get lower while the requirements increase," he confides. "At the same time you cannot expect artists to work super-long hours without remuneration, so juggling this to find the right balance is key."

A major advantage in running Luxx are Clapham's many years of experience as an active member of Beta testing teams from major developers such as Maxon, Adobe and Trapcode. "It can be hard balancing real-world projects alongside working as part of a beta team. You're working with Beta or even Alpha software where the features may change from version to version and often things can be unstable," Tim explains. "However, this is a fine price to pay for the immense privilege of working with developers to design and implement new features. It gives you a deeper understanding of the application and allows you access to killer new features before they are on general release."

After taking the challenges of Luxx's first few years in his stride, Tim Clapham has high hopes to keep the company running just as productively in the long-term, continuing to develop from accomplishments and ideas that had their initial inception more than a decade ago at HYPA. "We hope to still be creating respected, award-winning pieces of work that continue to challenge and globally inspire," concludes Tim.



F Luxx completed the complex animation for HBO Asia's Action Nation 2013 campaign based around the concept of steampunk, creating a logo using metal panelling, pipes and steel structures

G Working with Sydney-based The DMCI as 3D technical lead, Luxx was tasked with building the complex rig to animate the Discovery Kids logo for the Discovery Kids ID project

H In this project created for the 2011 VIVA rebrand launch, Tim Clapham worked with producer Von Dekker and the Umeric team at their studios in Sydney as a matchmoving and 3D artist

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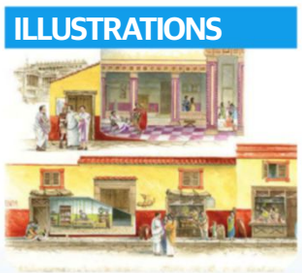

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Project Focus

Raising dragons

Pixomondo's Sabrina Gerhardt reveals the work behind the Emmy award-winning VFX and creatures in Game of Thrones

PIXOMONDO

Project *Game of Thrones*

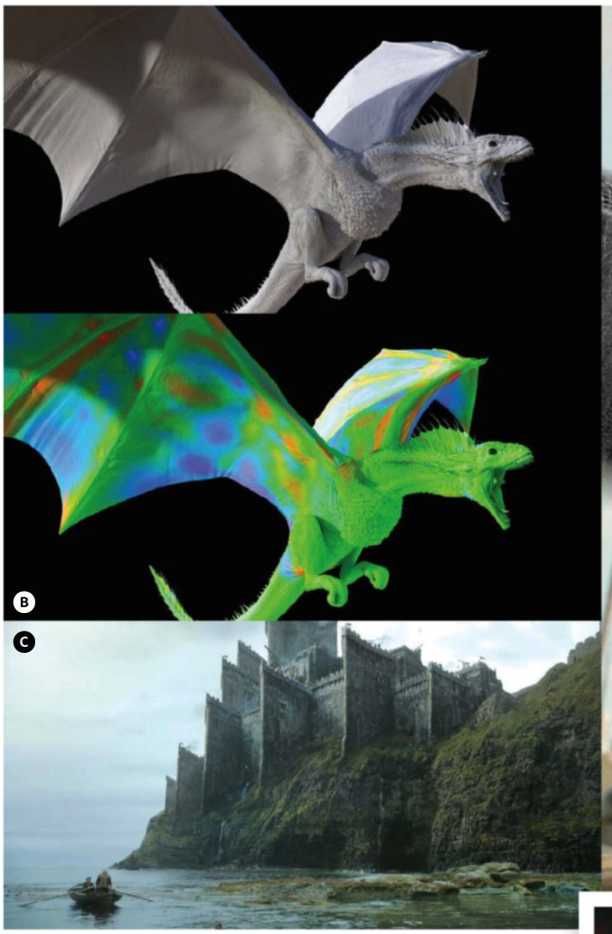
Description Seven noble families fight for control of the mythical land of Westeros. Robert Baratheon, King of Westeros, asks his old friend Eddard, Lord Stark, to serve as hand of the king, or highest official. Secretly warned that the previous hand was assassinated, Eddard accepts in order to investigate further. Meanwhile the Queen's family, the Lannisters, may be hatching a plot to take power for themselves.

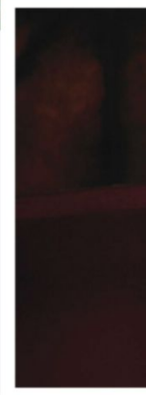
Company Pixomondo

Bio Pixomondo is a VFX company with a global network of studios. Founded in 2001 by CEO and executive producer Thilo Kuther, Pixomondo began its work creating video installations and 3D animations for high-end corporate clients. In 2012 the company received an Oscar for Best Visual Effects for its work on *Hugo*.

Country Germany & USA

Website www.pixomondo.com





For *Game of Thrones*, international VFX company Pixomondo's main goal was to raise the bar on TV visual effects, even going so far as to use the same pipeline that's normally reserved for feature films. The company achieved its goals with gusto, Pixomondo having already won an Emmy award for Outstanding Special Visual Effects for its work. The team uses Maya to create the hyper-real fantasy creatures for the show, imitating real animals as references to be able to make the fictitious CG counterparts as believable as possible.

"In season three, the dragons were not just bigger copies of the previous season. We actually had to rebuild them and spend a huge amount of time designing and developing the new features," explains VFX producer Sabrina Gerhardt. She explains that the team's main approach to creating convincing dragons was to build the CG animals from the inside out, focusing on creating an anatomically correct skeleton before the muscles and skin.

"This time the camera was also much closer to the dragons, so we had to go into much more detail," continues Gerhardt. She reveals that some of the new features were added to make the dragons look more like teenagers, such as a smaller head and even extra spikes around the face and neck to resemble the growth of a first beard. The most aggressive of the three dragons, Drogon, also received a new, more-detailed jaw. One scene in particular shows how much more dangerous the dragons have become as they have grown older. "The jaw had a special mechanic that could hide in a normal position, then slide out and extend when Drogon goes into a threatening mode," says Gerhardt. "The complete inner-mouth section had to be very precise, with a tongue, glands for fire-breathing and teeth covered in saliva, with the camera facing right at them."

In another scene, one of the teenage dragons also had to breath fire upon one very unfortunate character. "They shot a plate with the actor only playing at getting burned, then the same plate with a stuntman getting grilled by a real flame-thrower near the position the dragon's head would appear later. These plates were finally combined with an invisible wipe and the CG dragon was added," Gerhardt explains. "The interaction starts in our Matchmove department. Not only is the camera being solved there, all the surrounding actors that interact with or

> "The dragons were not just bigger copies of the previous season, we had to rebuild them and spend a huge amount of time designing the new features"
>
> **Sabrina Gerhardt, VFX producer, Pixomondo**

Contributors

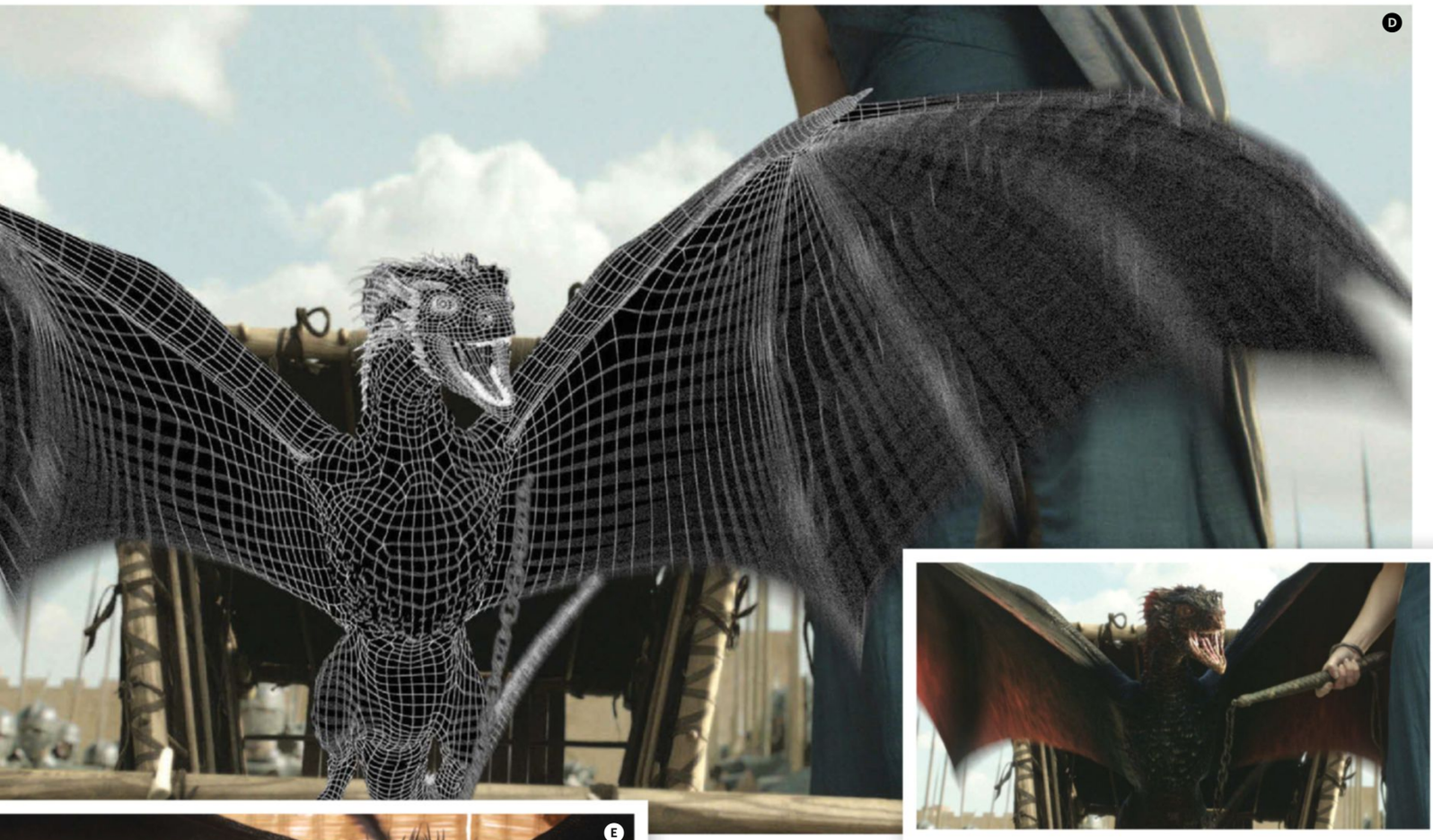
Sven Martin
VFX supervisor

Sabrina Gerhardt
VFX producer

A To create the vast armies, Pixomondo mostly used the traditional method of replicating extras into the depth of the scene. Wide shots could be made up of plate elements with the main actors or card extensions, creating a full CG army

B Unlike the dragons of the later series, the direwolves in *Game of Thrones* are not CG at all, but real animals shot against a greenscreen and put back into the actor plates with scaled-up proportions. Obviously this method wasn't possible for the dragons

C Even with its prior work on the series, Pixomondo still found new difficulties. "Every new project comes with new challenges you've never faced before," says Gerhardt. "Even if it seems comparable, the workflow or best technique to use can be very different."



Fantasy environments

How Pixomondo created Game of Thrones-worthy environments

"Sets and environments are a combination of 3ds Max renders and projected matte paintings created in Photoshop," begins Gerhardt. Most of the footage used for the show was surprisingly acquired on a photo safari in England, which resulted in a multitude of high-resolution images of old castles, walls and landscapes for the team to use. "As with the creatures, the idea was to first start with a real castle and then move to changing or adding elements to shift the design into the world of Westeros," Gerhardt continues. For the water sims in the third season, Pixomondo used Naiad fluid simulation in conjunction with Thinkbox Software's Krakatoa and Thinking Particles.

cast shadows onto the dragons are tracked and rebuilt with low-res geometry. These additional shadow, reflection or global illumination layers are then used in comp to blend the digital creatures into the plate.

"The idea of not using a typical TV workflow with all-rounder artists being responsible for a shot alone was an undertaking," Gerhardt tells us. "We didn't know it would pay off with the tight schedule." She says that without using their feature film pipeline, Pixomondo wouldn't have been able to ultimately achieve the all-important quality needed for the show for deliveries every two weeks. "I think that is why visual effects are so much fun to work with: you conquer a mountain, which then reveals an even bigger and more challenging one."

D "For this series we could use a lot more real fire elements, which Joe Bauer, production visual effects supervisor, shot on the set," explains Gerhardt. "This was great to use, because we got all the fine detail, smoke and interaction all for free."

E From season two to three Pixomondo changed the body proportions for the growing dragons to resemble a typical bird skeleton. The wings also got enlarged to be more physically correct in relation to the more-mature bodies of the teenage dragons

F "By pushing shots through the various departments, we could have all the specialists doing what they do best. Working parallel also gives you the advantage of revising an idea very late in the progress if it makes a shot better," explains Gerhardt

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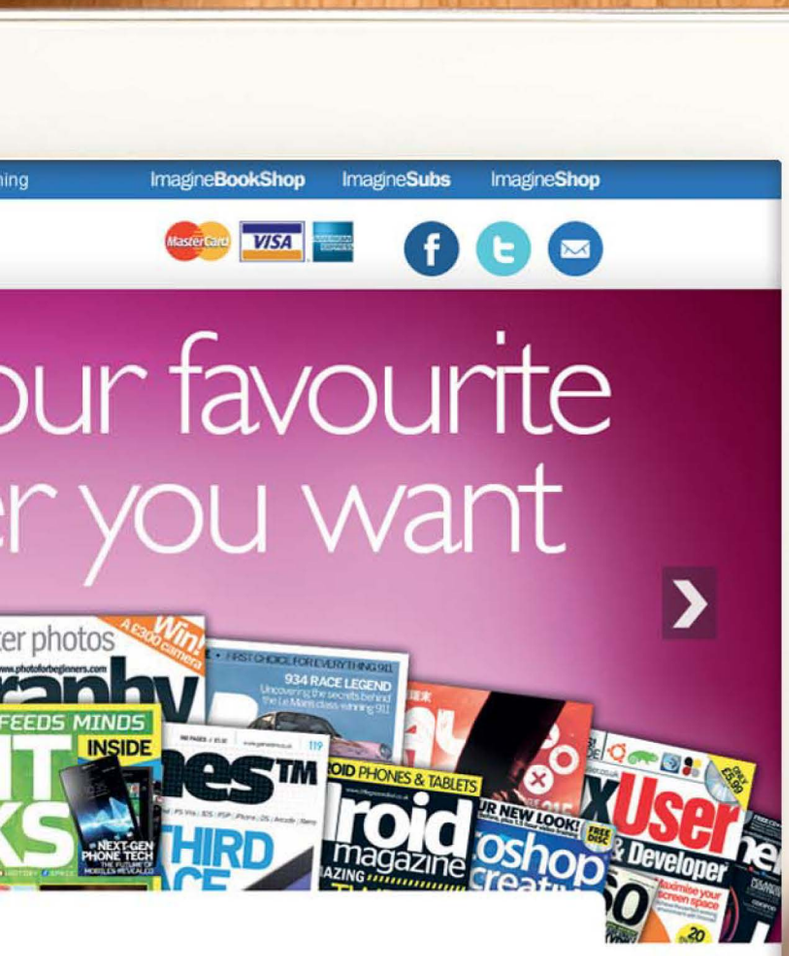

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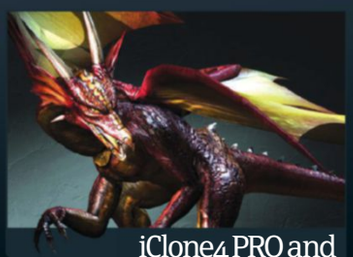

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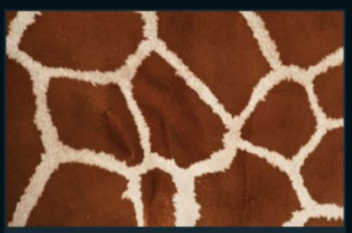

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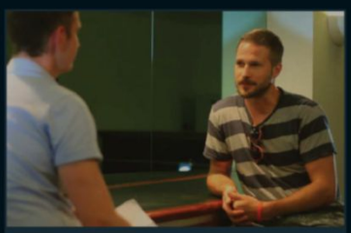

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